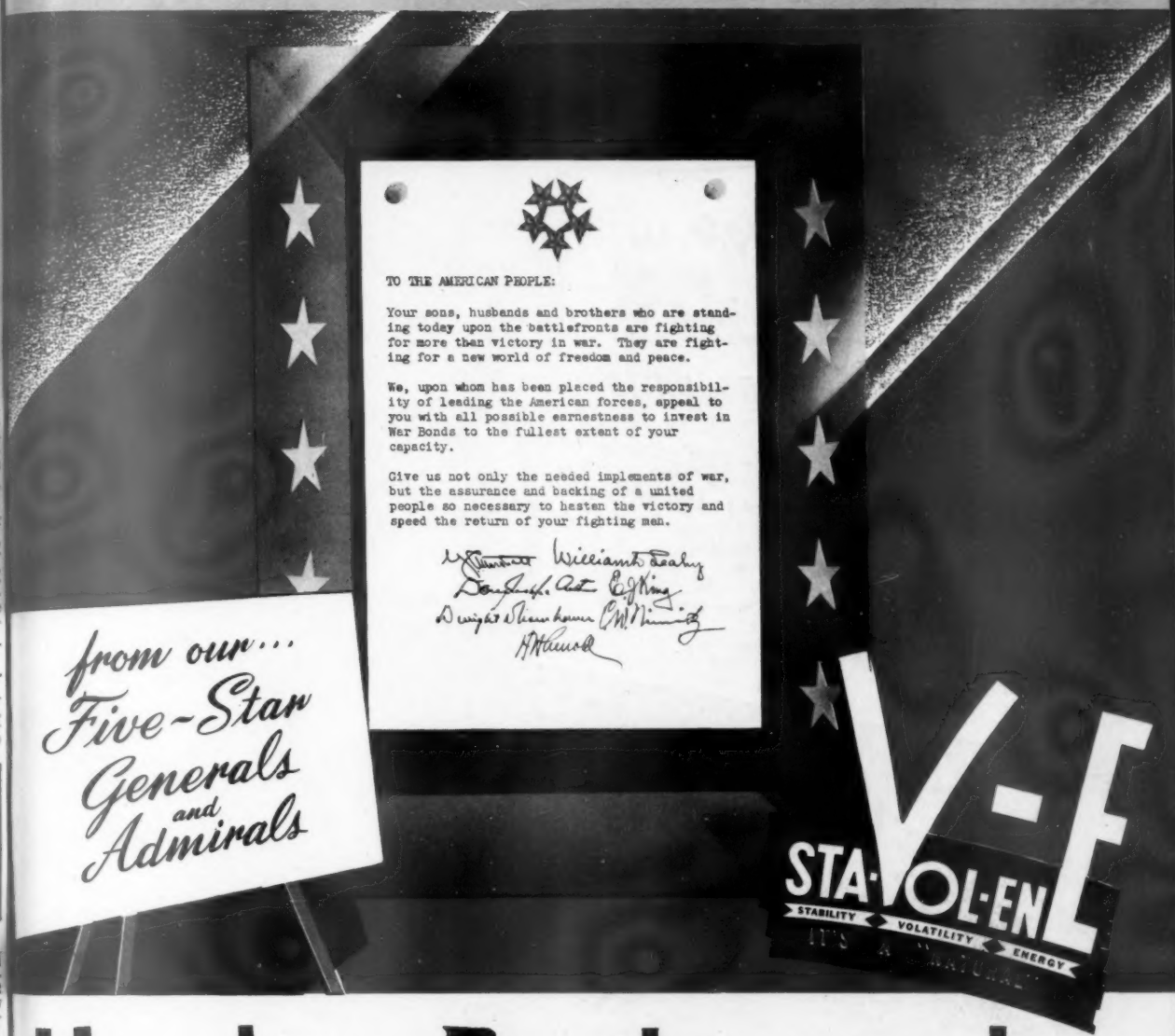
the OIL AND GAS JOURNAL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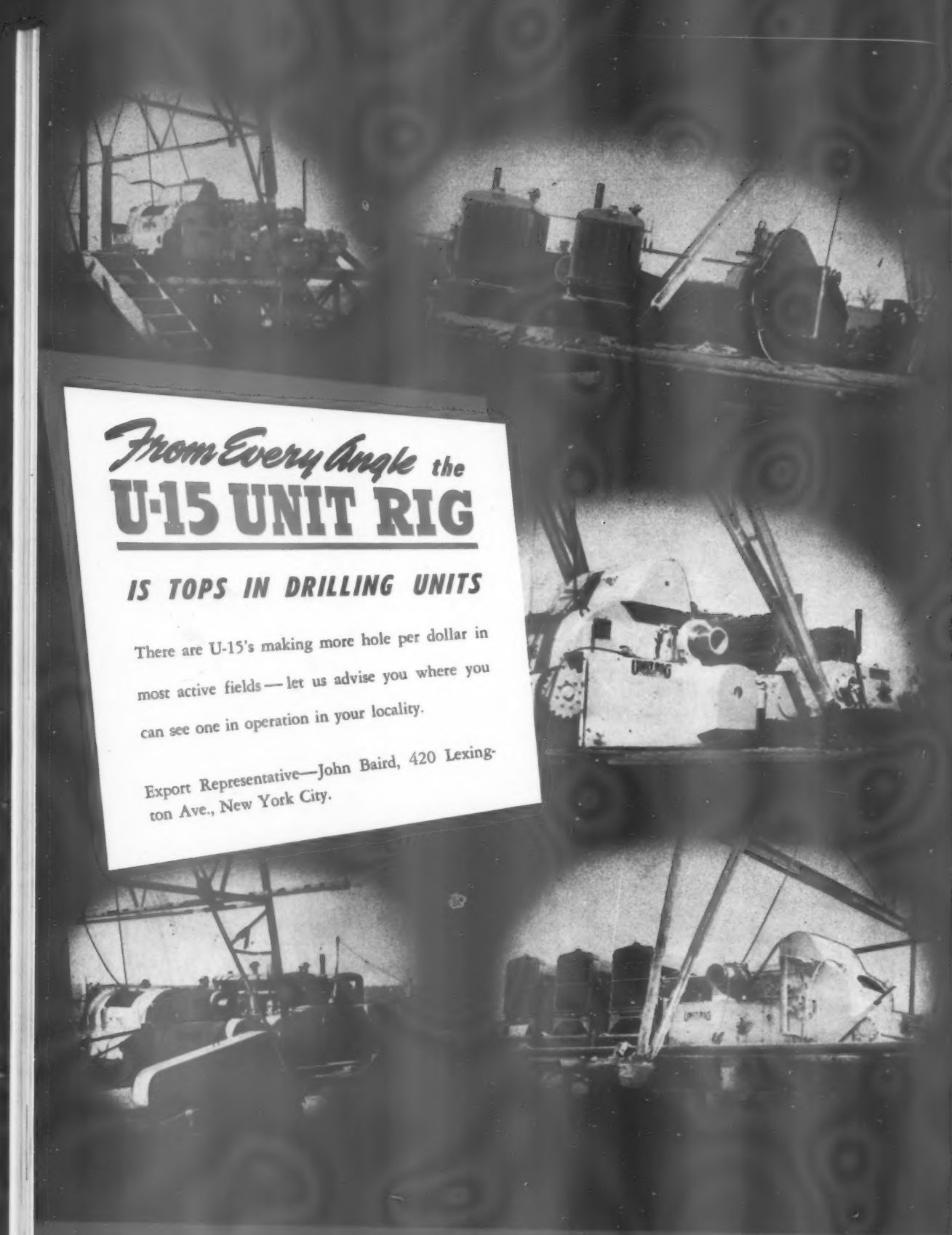

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Trends

Crude-Oil Production
By States—Page 160

CRUDE-OIL STOCKS 224,079,000 bbl. as of June 2, 1945—up 1,248,000 bbl. One year ago 231,290,000 bbl.

GASOLINE STOCKS 88,696,000 bbl. as of June 2, 1945—down 425,000 bbl. One year ago 86,801,000 bbl.

RESIDUAL FUEL-OIL STOCKS 39,022,000 bbl. as of June 2, 1945—up 474,000 bbl. One year ago 51,037,000 bbl.

GAS OIL AND DISTILLATE STOCKS 29,819,000 bbl. as of June 2, 1945—up 635,000 bbl. One year ago 32,640,000 bbl.

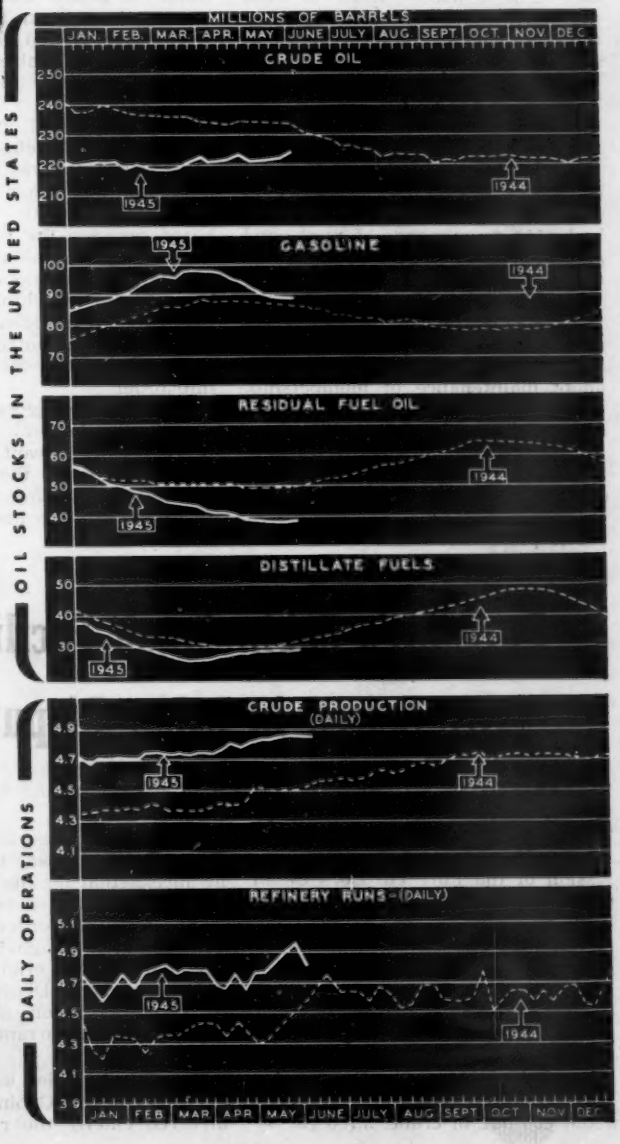
CRUDE-OIL PRODUCTION 4,851,050 bbl. as of June 9, 1945—down 2,000 bbl. One year ago 4,526,900 bbl.

REFINERY RUNS 4,804,000 bbl. daily week ended June 2, 1945—down 146,000 bbl. One year ago 4,639,000 bbl.

RECORD low position of residual fuel-oil stocks is one of the most troublesome problems currently confronting refiners and industrial committees charged with maintaining adequate supplies of petroleum products for the military establishments and essential civilian activities. A little-publicized order from the Petroleum Administration for War this week served to focus attention on the extremely delicate balance existing between current supplies of residual fuel oil and minimum requirements. The PAW directive prohibits use of low-grade residual fuel stocks for street and highway maintenance, paving and repair. The order itself is not of industry-shaking importance but it does show that stocks are at critical levels.

CURRENT residual fuel-oil stocks are below 40 million barrels and more than 50 per cent of the industry's inventories are in the hands of California operators. In 1941, the last prewar year, mid-June stocks of residual fuel oil totaled 91 million barrels with subsequent declines to 80 million in the middle of 1942, 68 million in 1943, 50 million in 1944. Meanwhile, total domestic and export requirements for residual fuel oil have risen from 1,093,900 bbl. daily in 1941 to an estimate of 1,424,000 for 1945. Production of residual fuel oil, on the other hand, is currently and projected on a plane of about 1,350,000 bbl. daily, accounting for slightly more than 28 per cent of the products realized from the average barrel of crude oil.

PART of the reduced stock position of heavy fuel oil can be accounted for by substantial diminishment of imports from South America during the war when tankers were utilized on whatever voyages provided the most direct and abundant supplies. Furthermore, most of the European war emphasis was on day-to-day increases in production of aviation gasoline. Therefore, moderate increases in production of residual fuels were insufficient to offset declines in imports and the emphasis on maximum use of light crudes for more gasoline. The current refining program offers little opportunity for improving the residual-fuel situation. Adjustments in domestic manufacturing operations can be made to the extent necessary to avoid serious interruptions in industrial activity but there is little hope for correcting the stock position until Japan is defeated.



Ingleside Injunction Continued Pending Study of Testimony

HOUSTON.—Judge T. M. Kennerly, of the U. S. District Court, reserved his decision following a hearing June 11 on the petition of Humble Oil & Refining Co. for a permanent injunction restraining the U. S. Government from seizure of the company's refinery at Ingleside, Tex. Judge Kennerly said he would take under advisement the testimony presented at the hearing and probably would deliver his opinion June 20. Meantime the temporary injunction granted by him June 6 will continue in force. The case centers about efforts to compel the company to observe maintenance of membership at Ingleside.

Humble officials say they are unable to understand why President Truman ordered seizure of the plant. Hines H. Baker, executive vice president of the company, said the plant is manufacturing large quantities of products necessary in prosecution of the war and there had been no stoppage of work, and so far as known no serious threat of interruption.

The company contends that the War Labor Board is apparently using the seizure method to enforce an order requiring the company to adopt maintenance of membership, which would force the discharge of any employe who fails to continue his membership in the Oil Workers International Union (C.I.O.). The case is on appeal before the Supreme Court.

The president's order was recommended by William Davis, director of economic stabilization. In a report to Davis, WLB said the company had refused to allow its relations with employes to be governed by the terms and conditions of a WLB directive. WLB added that this action "is viewed as a threat to continued production at the company's plant."

The board asserted approximately 285 employes were involved in a dispute at Ingleside.

A strike vote conducted November 16, 1944, by the National Labor Relations Board was announced as having resulted in 187 votes for a work stoppage and 119 against.

Secretary of Labor Frances Perkins certified the dispute to WLB May 29, 1943.

On September 7, 1943, the Dallas Regional WLB held that the sole issue in dispute was the union's demand for maintenance of membership. Subsequently the national board reversed the regional board's denial of the union's request for maintenance of membership. After hearings in Washington the national board decided unanimously to require the company to comply with the maintenance - of - membership order.

The company refused, and on appeal to the Federal District Court at Dallas was granted an injunction against the government agencies. This injunction subsequently was set aside by a Circuit Court of Appeals.

Pure Oil's Cabin Creek Facilities Are Seized in Labor Dispute

WASHINGTON.—An executive order signed June 5 by President Truman directed Petroleum Administrator Harold L. Ickes to take possession of the Pure Oil Co.'s Cabin Creek oil field at Dawes, W. Va.

The executive order directed the petroleum administrator to take possession "of plants and facilities at the Cabin Creek oil field . . . and to operate or arrange for operation of plants and facilities in any manner that he deems necessary for the successful prosecution of the war."

The Cabin Creek field produces about 800 bbl. of crude, 5,700 gal. of natural gasoline and 6,000,000 cu. ft. of gas daily.

Deputy Administrator Ralph K. Davies made it clear that PAW has no jurisdiction for the settlement of the dispute that led to the issuance of the executive order. The deputy administrator designated James R. Wylie, director of production for the Atlantic seabord (District 1 of PAW) to take possession of the Cabin Creek field and arrange for its operation.

The dispute which led to stoppage of work in the Cabin Creek field involved chiefly the refusal of the Pure Oil Co. to put into effect the terms of an order issued by the War Labor Board of December 1, 1944, directing the company to sign a contract with the International Oil Workers Union providing for maintenance of membership and checkoff of union dues.

The board also approved a termination clause provided for yearly renewals of the contract and leaves of absence for certain employes to attend to union business, but denied the union request for severance pay and a 30-day trial period for union members seeking promotion to a more advanced job prior to hiring outside workers. The chief controversy, however, was maintenance of membership and the checkoff.

Many B Coupon Holders Can Get More Gasoline

WASHINGTON.—Increased gasoline rations became available June 11 for some 3,000,000 of the 8,553,200 holders of regular B coupons. On that date ceilings were raised to 650 miles a month by Office of Price Administration.

"Only those B ration holders whose essential occupational driving needs exceed present B ceilings for their regions—325 miles a month in the East, 475 miles in the Midwest and 400 miles in the Far West—will be eligible for an increase," Max McCullough, deputy administrator for rationing, explained. "The amount of the increase for eligible B-card holders will vary with their actual occupational driving needs, but in no case may their total rations exceed the new ceiling. Other B-ration holders—such as home-to-work drivers who are getting what they need under present ceilings—should not apply for any increases since their applications will have to be rejected and will only add to the work of the local War Price and Rationing Boards."

$40,000 Appropriated to Drake Well Memorial Park

HARRISBURG, Pa.—Gov. Edward Martin of Pennsylvania has signed a bill appropriating $40,000 to the Pennsylvania Historical Commission for the next biennium to be used for Drake Well Memorial Park. The money will be used to: (1) Secure detailed architectural and engineering plans for the further development of the park and museum; (2) complete the erection of the Drake well replica; (3) make the necessary repairs and replacements to the property, and (4) purchase certain historical materials relating to the Drake well and early petroleum history.

O'Mahoney Committee to Hear Impressive List of Witnesses

WASHINGTON. — Hearings before the Senate committee on petroleum resources resuming June 19 will include a discussion of title to submerged oil lands off the California coast in addition to a detailed study of sources of petroleum in the United States as previously scheduled, it has been announced by the chairman, Sen. Joseph C. O'Mahoney of Wyoming.

"The forthcoming hearing will be among the most important in the series conducted by the committee," said Senator O'Mahoney. "We shall receive evidence from government, industry, and other witnesses on such vital matters as the relation of the domestic petroleum supply to national defense; methods of production of liquid and gaseous petroleum, and means of conservation through secondary recovery; the public lands; synthetic production; petroleum substitutes; factors affecting production, such as governmental competition, price, taxation, etc."

Chairman O'Mahoney also stated that the committee was interested in the much-discussed question of oil resources under the territorial waters off the coast of the United States. It is expected that witnesses from the State, Interior, War, and Navy departments will go into this subject before the investigating committee.

Among the witnesses from the Government will be Assistant Secretaries of the Interior Michael Strauss and Oscar Chapman; Charles Rayner, petroleum adviser, Department of State; William A. Brophy, Commissioner of Indian Affairs; Capt. W. G. Greenman, director of the naval petroleum reserves; Capt. C. P. Franchot, U.S.N.R., and Brig. Gen. H. L. Peckham, War Department liaison officer for petroleum.

The presentation by the oil industry will be under the direction of John M. Lovejoy, president of Seaboard Oil Co. of Delaware. Lovejoy has arranged for various experts to discuss the numerous subjects under investigation. Such witnesses will be, among others, J. Edgar Pew, president, Sun Oil Co.; E. L. DeGolyer, consulting engineer; M. C. Haider, production research engineer, Standard Oil Co. (New Jersey); Walter S. Hallanan, president, Plymouth Oil Co., and A. C. Mattei, president, Honolulu Oil Corp.

I.P.A.A. Seeks Price-Law Amendment To Consider Oil-Discovery Costs

WASHINGTON. — A request that the price-control law be amended to require the Office of Price Administration to consider exploration and replacement costs in fixing price ceilings on crude petroleum was made by Russell B. Brown, general counsel of Independent Petroleum Association of America, before the House committee on banking and currency, which is considering a bill to continue the act beyond its expiration date of June 30.

Brown contended that OPA is misinterpreting the law by refusing to consider discovery costs as part of the current expense of doing business, and he asked that the wording be changed so that there can be no alternative construction. He declared the OPA pricing policy does not consider the need for maintaining an adequate supply of oil and for conservation of resources, nor the cost of finding and producing crude, including accelerated depreciation and depletion due to excessive wartime production. He attacked the OPA refusal to consider percentage depletion as an item in production costs, although, he said, it is a recognized accounting practice which OPA is directed by law to consider.

"Last year Congress made amendments to the law that could enable us to get relief," said Brown. "The price administrator has refused to comply with the law as contained in these amendments. Our advance appraisal of the subsidy method was correct. It has prolonged the life of some wells that would have been abandoned, but it has not supplied funds that would stimulate exploration.

"It would be helpful if your committee would give close examination to this cost-of-replacement question. This has long been a point in controversy. The industry position simply is that it is selling its goods at less than cost of replacement. Replacement is accomplished only by discovery of new sources of supply.

"Is it necessary to effect such replacement? Is there need of new fields? I think these questions were answered eloquently by Ralph K. Davies, deputy petroleum administrator, on May 7, in a statement which included the following:

" 'In the United States the current rate of production exceeds even the maximum efficient rate for the fields by some 250,000 bbl. per day; a condition only justified in the national emergency. The slack has all been taken up—and more. Domestically, we meet the demands for the present only with the valves opened wide and with a deliberate discount of the future.'

"If the oil-producing industry were relieved of the Government control of price, I believe that the needs would be recognized within the industry and that the element of replacement costs would be accorded its due weight in price revisions. It appears certain, however, that we must live under a regulated price for some time to come. Because of this prospect, I urge this committee to amend the act so that there can be no alternative construction with regard to the standards used in fixing prices on crude petroleum."

Charge OPA Ignoring Mandate of Law

WASHINGTON.—Charges that the Office of Price Administration is ignoring the mandate of the law and the requests of congressional committees in the procedures used in making its current survey of cost of producing crude oil were aired this week before the House committee on small business.

Charges came from Merle Becker, vice president of W. C. McBride, Inc., St. Louis producer and a member of the OPA crude-oil industry advisory committee, Russell B. Brown, counsel of that committee, and James V. Brown, its secretary. Chief allegation was that OPA is not following accepted methods of accounting, as instructed by law, by refusing to consider current replacement costs and percentage depletion allowance as elements of production costs.

Vigorous denial of this charge was made by Paul M. Green, deputy OPA administrator for accounting, who cited several authorities and referred to annual reports of many large oil companies, all prepared by prominent accounting firms, to show that the method used by OPA is practiced by recognized accounting experts.

The industry witnesses countered

that nevertheless these methods are not the ones used by most independent producers, and when the discussion got technical Chairman Wright Patman asked that accounting experts on both sides of the argument get together and attempt to narrow the field of controversy for the understanding of the committee.

The industry witnesses also contended that OPA has delayed ascertaining production costs as requested by the Patman committee and that the current study is endangered because the questionnaire is so complicated, and OPA sent it to so many former producers no longer in business, that the percentage of completed returns may be too small to receive consideration.

OPA officials were scheduled to give their side of the argument later in the week.

OPA Grants Higher Prices For Crude in Eight Fields

WASHINGTON. — Price increases ranging from 4 to 25 cents a barrel have been granted by Office of Price Administration for sweet crude produced in seven Wyoming fields. At the same time an increase of 5 cents was announced for crude produced in the Luby field, Texas. The increases, all retroactive to June 1, are designed to bring ceilings up to levels for comparable crude produced in the same general areas. They will be absorbed by refining companies and not passed on to consumers.

The new ceiling for Luby field is $1.40 a barrel for oil of 40° gravity and above. This field has a current daily production of 4,000 bbl.

Between 7,000 and 8,000 bbl. of sweet crude are produced daily by the seven Wyoming fields. One ceiling of $1.25 a barrel for 40° gravity oil and above, with a 2-cent differential for lower gravities, is established for all seven. The fields are Badger Basin, up 15 cents; Bailey dome, up 5 cents; Cole Creek, up 5 cents; Crooks Gap, up 5 cents; Elk Basin, up 25 cents; Grass Creek, up 25 cents, and Rock Creek, up 4 cents.

Ceilings for sour crude produced in four other Wyoming fields were increased 12 cents a barrel on May 14.

Nineteen Tankers Finished For Maritime Commission

WASHINGTON.—Among 112 ships delivered in May, 19 were tankers, according to U. S. Maritime Commission. Classified as to types, there were 16 T2 tankers, 1 private tanker, 1 T3 tanker, and 1 T2 naval tanker.

States Show Vast Progress In Natural-Gas Conservation

OKLAHOMA CITY. — Vast progress has been made by the industry and state regulatory bodies in conservation of natural gas, it was disclosed here this week at the summer quarterly meeting of the Interstate Oil Compact Commission. Most of the 3-day session, June 14, 15, 16, was devoted to state, regional and national reports on natural-gas production, reserves, and conservation.

Texas, for example, reduced gas waste from 37.43 per cent of total production in 1935 to 4.57 per cent in 1944, according to Jack K. Baumel, director of production for the Railroad Commission.

Alec M. Crowell, Jackson, director of the Mississippi Oil & Gas Engineering Committee, estimated national proven reserves of natural gas at 135 trillion cubic feet. The current reserves, according to Crowell, represents an increase of 15 trillion cubic feet. He calculates the volume of natural gas to be marketed in 1945 at 4.5 trillion, an increase of 8 million cubic feet. He anticipates that production from natural-gasoline and cycling plants this year will total about 120,000,000 bbl.

He estimates the gas reserves of Texas at 64,153,782,000,000 cu. ft., and reported 1944 production of 2,434,718,000,000 cu. ft., with an estimated 375,000,000,000 cu. ft. of casinghead gas unreported.

Baumel's estimate of recoverable Texas gas reserves showed 22,680,916,000,000 cu. ft. or 35.36 per cent of the state's total to be located in the Panhandle and 19,210,302,000,000, or 29.94 per cent, on the Gulf Coast. Just 92 gas fields produce little or no oil, Baumel said.

Panhandle field contains approximately one fourth of the nation's total gas reserve, Baumel said.

The state's largest gas field, besides the Panhandle, is Katy on the Gulf Coast with an estimated 7.5 trillion cubic feet, followed by Carthage in East Texas with an estimated 4 trillion cubic feet in place and 300,000 surface acres, a larger surface than Katy. Stratton-Agua Dulce fields' many sands near Corpus Christi are estimated to hold 3.5 trillion cubic feet of gas.

The richest condensate field is Lake Creek in Montgomery County, which produces 120 to 250 bbl. of liquids per 1,000,000 feet of gas. It has produced 2,453,502 bbl. of liquids and 15,757,180,000 cu. ft. of gas since its beginning and it's rated to contain 58,000,000 bbl. of liquids in all.

The state-wide recoverable reserve of condensates is estimated at 1,160,092,000 bbl.

Without undertaking to estimate the amount of gas exported from Texas, Baumel reported the following distribution of Texas gas in 1944:

"Although 41.53 per cent of the total gas produced and reported to the commission for 1944 went to pipe lines for light and fuel, 38.04 per cent of the gas was used in oil field operations, of which 24.04 per cent went to repressuring and recycling, 4.22 per cent went to gas lift, and 9.78 per cent was used for fuel and lease operations.

"The carbon black industry in Texas utilized 12.55 per cent of 1944 gas production. The 38 plants used 305,421,000,000 cu. ft. of gas and produced 483,278,386 lb. of carbon black. The average yield of carbon black in 1944 was 1.58 lb. per 1,000 cu. ft. In 1943, the average yield of carbon black was 1.48 lb. per 1,000 cu. ft. of gas."

New Spacing Patterns For Kansas Fields

CHICAGO. — Revised regulations on specified optional oil well spacing patterns in the Hansen and Ray fields, Phillips County, Kansas, in the Abbeyville field, Reno County, and in the Rogg (North Atherton) field, Russell County, were announced by the Petroleum Administration for War.

For the Hansen, Ray, and Abbeyville fields, the optional pattern is within 30 ft. of the center of either the northeast quarter of a quarter-quarter section, or the southwest quarter of a quarter-quarter section. For the Rogg (North Atherton) field, the optional pattern is within 30 ft. of the center of the northwest quarter of a quarter-quarter section, or the southeast quarter of a quarter-quarter section.

Penn Grade Directors to Meet With Bradford Group

OIL CITY.—Directors of the Pennsylvania Grade Crude Oil Association will meet June 28, at the Emery Hotel, Bradford.

After completing customary business, the board will take part in the annual meeting of the Bradford District Pennsylvania Oil Producers' Association at the Pennhills Club near Bradford.

THIS WEEK

LABOR—Court continues injunction against government seizure of Humble's Ingleside refinery pending study of testimony. . . . Issue is maintenance of union membership. . . . ¶President orders seizure of Pure's Cabin Creek oil field at Dawes, W. Va. . . . Maintenance of membership and union checkoff are issues. . . . ¶PAW says Middle West and East Coast lose 1,800,000 bbl. of oil products as result of 5-day strike at Gulf's Port Arthur plant. . . . ¶Mexican drillers protest employment of Americans who get $500 a month while natives get $204.

REFINING—Indiana Standard completes first government contract for toluene 9 months ahead of time. . . . ¶Sinclair's Houston refinery finishes 4,000,000th bbl. of aviation gasoline. . . . Corpus Christi plant its 2,000,000th. . . . ¶Issuance of patents reveals new methods of producing butadiene from diisopropyl and ethylene. . . . ¶Texas and Shell considering construction of refineries on Colombian coast. . . . Both projects contingent on development of supporting crude production. . . .

WAR—Standard (New Jersey) finds properties in France and Italy heavily damaged, but most of them can be restored to use. . . . ¶Terrific bombing of Jap oil sources promises to shorten war by depriving her of fuel for planes, tanks, ships. . . . ¶PAW directs district offices to countersign purchase orders for all oil-production items except oil-country tubular goods. . . .

PRODUCTION—Completions continue to run ahead of 1944, but signs point to curtailment. . . . Unsatisfactory prices for crude and uncertainties over deductibility of intangible drilling costs for tax purposes among discouraging factors. . . . ¶Russell Brown, I.P.A.A. counsel, urges amendment of price-control law to require OPA to consider exploration and replacement costs in fixing crude ceilings. . . . Higher prices would stimulate exploration. . . . ¶National daily crude production 4,851,050 bbl. . . . down 2,000. . . . Minor increases in Texas and California offset by drop of 8,750 in Kansas. . . . ¶More than 400,000 bbl. current daily crude output in U. S. coming from pools discovered since Pearl Harbor. . . .

NATURAL GAS—FPC assembling staff for natural-gas investigation. . . . Texas sees its "sovereign right" to control production and conservation threatened by this federal inquiry. . . . ¶Gas waste in Texas reduced from 37.43 per cent of total production in 1935 to 4.57 in 1944. . . Of gas still vented to air 92 per cent was at gasoline plants. . . .

O'MAHONEY—O'Mahoney committee will resume hearings June 19 on sources of petroleum. . . . Testimony to cover relation of domestic supply to national defense, petroleum substitutes, synthetic production, secondary recovery, etc. . . . Will take up status of oil under coastal waters, now subject of suit begun by Government. . . . Title of these tideland properties now lively issue. . . .

TRANSPORTATION—Little Big Inch, designed primarily to move military gasoline, now supplying civilian products to Atlantic seaboard. . . . ¶Volume of oil moved by pipe lines in first quarter 6.4 per cent higher than in 1944. . . . Gain in revenue 3.6 per cent. . . .

DRILLING—French mission seeking contractors here to drill exploratory wells on structures in southwestern France. . . . ¶One major company cancels locations for 100 tests in Texas. . . . Another cancels order for 400,000 tons of casing. . . .

Press Association, Inc.

A view of the synthetic-gasoline plant that was cunningly erected under the natural camouflage of trees in a rural district of Germany just after it was captured by fast-moving units of the Ninth Armored Division of the U. S. Army

Typical of the fleet oiler is the USS Sabine, which has been in every engagement since Pearl Harbor except Iwo Jima

Oil Tanker Heart of Floating Bases, Admiral Nimitz' "Secret Weapon"

by Henry D. Ralph

This is the fifth article in a series which describes the task of fueling the Pacific war. Material for the articles was gathered by the Journal's Washington editor while a guest of the Navy on an inspection of Navy fueling and operating bases.

IN THE CENTRAL PACIFIC.—The oil tanker is the key to the secret of how the American fleet has been able to fight continuously in Japanese waters thousands of miles from our home shores.

This is the claim of tanker men operating in the Pacific, and they have good evidence to substantiate it.

For the tanker was the forerunner, then the nucleus, and is still the heart of the "Service Squadrons"—the "floating bases" which Fleet Admiral Chester Nimitz calls his "secret weapon" which upset all Japanese planning and enabled the Navy to fight its way clear to the shores of Asia.

Not only do the tankers supply fuel to combat ships on the fighting line but they also pass over all kinds of other supplies "on the run". Their successful experiments paved the way for a whole fleet of specialized ships equipped to pass ammunition, fresh provisions, stores and equipment of all kinds on the high seas right in the combat area.

Before the war the U. S. Navy, and the fleets of some other nations, made limited experiments in fueling at sea, but during the past 3 years methods and equipment have been developed far and away superior to anything attempted by any other fleet in the world, enemy or Allied. The floating bases which have grown up around these refueling operations now include hundreds of supply and repair ships of many types, but the tanker was the vanguard.

The job of the fleet oiler is one of the toughest and most spectacular in the Navy, but the chief regret of the tanker men is that security reasons prevent telling the whole story of their part in this war. Though classified as noncombatant ships they spend much of their time in the battle area and seldom get completely out of danger of enemy attack.

War Correspondent Ralph, snapped on Guam while observing Naval operations

Typical is the fleet oiler AO-25, the U.S.S. Sabine, which has been in every engagement since Pearl Harbor except Iwo Jima which took place when she was back on the West Coast for her only overhaul during the war.

The Sabine is particularly interesting to oil men because she is one of the 12 commercial tankers built shortly before the war with special subsidies from the Navy and Maritime Commission to cover the cost of extra speed and installations to make her suitable for a Naval auxiliary if need be. Built as the "S. O. Albany" at the Bethlehem yards at Sparrows Point, Md., in 1940, she never saw commercial service for the Navy took her over as soon as she was ready for sea. Four of her sister ships were converted to escort aircraft carriers and one has been lost in action, but the others are the backbone of the fleet's fueling system since they are among the fastest tankers afloat.

"In the early days of the war," explains Lt. Comdr. Hans Christian von Weien, a former Los Angeles entomologist who is now skipper of the Sabine, "one tanker accompanied half a dozen crusiers or other ships on a mission, fueled them at sea, and returned to port for another load. Now as many as a couple of dozen fleet oilers, organized as a numbered task group, constantly accompany each fleet or task force. At least one-third of the group remain in a designated rendezvous

area on the high seas close to the fighting, while the other oilers are plying to and from the supply points.

"We may stay in the fueling area for a month or two at a time, taking on partial loads from other oilers which are due to return empty. When our turn comes to go back for a load we usually have barely enough fuel in our bunkers to make base."

The base where the fleet oilers refill is one of the floating bases anchored in the shelter of some once Japanese-occupied island as close as possible to the fighting area. Oil is brought to these floating bases by merchant tankers operated by the War Shipping Administration and pumped directly into the fleet oilers. Since the fleet oilers normally can refill and be on their way in a couple of days their crews may go for months on end without ever setting foot on land. The Sabine, for example, has steamed more than 200,000 engine miles but has been to a mainland port only once during the war.

Constantly on the Move

Out in the refueling area, which right now is near Okinawa, the Sabine and eight to a dozen other fleet oilers keep moving constantly. Also in the squadron are ammunition ships, refrigerator ships, and general supply ships, all equipped, like the fleet oilers, to pass supplies while under weigh, plus a protective force of escort vessels and carriers, all directed from the flagship of the task group commander.

Fueling at sea is done in all kinds of weather short of an actual typhoon, and at a good rate of speed, usually 10 or 12 knots. The operations start before daylight and may continue well after dark. Special gear, which can't be described in much detail, is required, but the chief requirement is a high degree of skill and seamanship. Hand lines are thrown from the oiler to the fighting ship running alongside, and the heaviest-type hawsers are strung between them.

The big hoses are suspended in the air by the ships' booms, with plenty of slack hanging in loops. To keep these loops from dragging in the water or getting too taut the supporting lines must be manipulated constantly. In the early days this was all done by hand, but now the Sabine, among others, is equipped with a number of high-speed logging winches to pay and take up the lines.

Ordinarily the two ships are steaming 60 to 80 ft. apart, but the crew must keep a couple of hundred feet of hose hanging in the air. In a heavy sea the vessels may yaw as much as 10° or 12° or may have to change their course suddenly, so the crew must keep constantly alert to avoid strain on the rigging. During the first few hours the oiler is so low in the water that waves keep breaking over the well deck, buffeting the crew, and the Sabine has had as many as 18 men at one time laid up in her sick bay with broken bones.

Carriers are the hardest to fuel at sea because of the deck overhang, but the operation goes on even when planes are taking off the deck for a strike. To make matters worse, an oiler is usually fueling two ships at the same time, one on each side, and may fuel as many as a dozen ships in a single day. When two oilers have discharged half their loads, one of them empties into the other and goes back for more, so there are always 8 or 10 full oilers with the fleet.

Only Part of Service

But this fueling operation is only a part of the service performed by the fleet oilers. While the fuel is being pumped, other lines are busy exchanging mail and personnel and passing over supplies of all kinds.

The practice started when the ship being fueled would beg for a crate of oranges or something else badly needed, and the oiler, due to return to port soon, would pass over anything she happened to have aboard. Soon the oilers were depended on to carry mail to and from the fleet at sea and to remove sick or injured crew members, and before long the oilers became loaded down with all sorts of supplies.

The Sabine, for example, is fitted with a false deck or superstructure above her valve deck, just to carry these extras. On a typical trip she may carry as many as 50 men and half a dozen officers as replacements for the crews of ships of the fleet, and may bring back as many who are being relieved—all of them, including sick and injured, being passed across the open water on lines during the fueling operation. In addition she may have a heavy deck load of packaged lubricants, belly tanks for carrier aircraft, medical supplies, fresh and dry provisions, ammunition, depth charges, clothing, and other stores. Smaller ships are often supplied with fresh water from the Sabine's oversize distilling apparatus. On one trip she

Enlisted men aboard a U. S. Navy warship secure lines passed from another ship drawing alongside to take on fuel (left). In the cut at right, a cascade of water foams over an oiler as it draws alongside a warship to transfer oil during a battle mission. (Official U. S. Navy photographs)

brought back 18,000 empty shell cases, transferred from fighting craft alongside her.

These activities of the fleet oilers have led to the use of other types of ships equipped to pass supplies at sea, so there are now whole squadrons doing what the tankers had to do alone in the early days. This new development has done much to relieve the strain on the fleet oilers and speed up their turnaround, but the tankers are still the chief means of physical contact between the fleet and the bases.

The Sabine has an over-all length of 553 ft. and a beam of 75 ft., a rated speed of 18 knots, and normally carries a crew of 275 men and 19 or 20 officers. Her tanks have a cubic capacity of 140,000 bbl. but due to the extra weight of her guns, gear, and deck load she does not carry that much on a refueling operation. A typical load would be around 100,000 bbl. of fuel oil, 7,000 or 8,000 bbl. of diesel, and about 6,000 bbl. of aviation gasoline, plus some 200 drums of lubricants and as much as 200 tons of ammunition and other stores as a deck load.

Many Narrow Escapes

In her 3½ years in the Pacific the Sabine has had some narrow escapes. Captain von Weien tells about the time he was fueling the battleship California during a night bombardment of Guam preceding the invasion. The battleship suddenly had to make a 180° turn, and in the rough seas the lines and hose parted. Both ships had to take a new course, come alongside, and set up new rigging to complete the refueling, all in pitch darkness and with no lights except one dim red flashlight.

On several occasions other oilers have been sunk by enemy action at places where the Sabine had been a few hours before. Once the Sabine bounced three times on an uncharted reef west of the New Hebrides but managed to get off without damage, and the spot is now called Sabine Shoals.

The place where the fleet oilers refill from merchant tankers changes with the course of the war, for it is always one of the floating bases which can move to a more forward anchorage on a few days' notice.

Typical is Service Squadron Ten, which for the past several months has been hiding out in the Western Carolines but may soon be in the Philippines, Okinawa, or somewhere closer to the fleet's scene of operations.

Service Squadron Ten is composed of several hundred supply, repair, barracks, and office ships and barges of many specialized types but, as is usual in the Navy, its oil section functions almost as an autonomous unit and is manned chiefly by former oil-industry men.

The U.S.S. Sepulga, an old Navy tanker too slow to be a fleet oiler, serves as the office ship and living quarters for the fuel division of Service Squadron Ten. Anchored in the middle of "tanker row" of whatever happens to be the squadron's base at the moment, the Sepulga's short-range radio voice system is busy constantly directing ships to fueling berths and handling orders for fuel and water to supply the ships of the squadron and those which put into the base for one reason or another.

There is no fixed storage in Squadron Ten, and the merchant tankers which arrive daily unload into fleet oilers or floating storage consisting of barges, old tankers, or the small yard oilers which serve ships in the harbor. Juggling the storage around and dovetailing the arrival schedules of fleet oilers and merchant tankers is quite some job, but normally the turnaround of the tankers in the harbor is only a couple of days. Big ships of the fleet, like battleships and carriers, have fuel brought to them in the anchorage, but others have to move down to tanker row to fuel. Incidentally, several of the anchored tankers are specially equipped as distilling ships and do nothing but produce and store fresh water for Squadron Ten.

In addition, the fuel division has to handle all the drummed lubes and other packaged petroleum products that come out as deck loads on merchant tankers or otherwise, provision the fleet oilers, keep supplies of hose, rigging, and other ship stores, and do everything else necessary to get both merchant and Navy tanker fleets out to sea again in the shortest possible time.

Large Staff Required

This work requires a big staff and, as might be expected, nearly all the officers and quite a few of the enlisted men came directly from the oil industry, including the following:

Lt. Comdr. Carl T. Munson, of Oceanside, Calif., chief fuel officer, for 15 years in the sales and operations departments of Shell Oil Co., Inc.

Lt. N. C. Loomis, Poughkeepsie, N. Y., bulk fuel officer, for 12 years manager of the bulk river terminal of Socony-Vacuum Oil Co., Inc.

Lt. James W. Duncan, Long Island, N. Y., drummed products officer, for 15 years district manager of Socony-Vacuum.

Lt. Lawrence Maher, Clifton, N. J., boarding officer, for 18 years district manager for Gulf Oil Co.

Lt. (jg) C. Wyatt, Wilmington, Calif., fleet anchorage officer, for 21 years head operator of the marine terminal of Standard Oil Co. of California.

Lt. (jg) Owen A. DeWoody, Kansas City, Kans., office manager, for 4 years chemist in charge of the plant laboratory of Socony-Vacuum.

Ens. John C. Kehrli, Portland, Ore., fuel records officer, for 8 years dispatcher and sales representative for Tide Water Associated Oil Co.

Chief Warrant Officer Byrd W. Coolidge, Midland, Tex., dispatcher, for 12 years district field superintendent for Atlantic Refining Co.

Chief Warrant Officer Thomas Q. Gordon, Brunswick, Ga., berthing officer, for 12 years terminal supervisor for Atlantic Refining Co. in Pennsylvania.

New Texas Plant to Use Scattered Gas

HOUSTON. — Contract has been awarded and construction has started on a $4,500,000 natural-gasoline absorption plant and gas-recovery system at Winnie, between Houston and Beaumont, by Glenn H. McCarthy, Houston operator. Contract was let to Stone & Webster Engineering Corp.

Low-pressure gas will be collected by a pipe-line gathering system from many wells in the north and south Stowell, Fannett and Fig Ridge fields and converted into components of aviation gasoline and other products.

To raise the pressure of the residue gas sufficiently for its transmission through lines to the Port Neches and Orange industrial areas, where it will be used for fuel, approximately 8,000 hp., will be required, according to D. C. Harmon, production manager for McCarthy.

"The gas recovered from the oil wells, together with high-pressure gas and distillate from deeper wells in the same area, will be processed in the absorption plant," Harmon said.

"The plant also will recover the liquefied constituents from the gas and will manufacture propane and butane, special products such as isobutane and isopentane, as well as specification grades of motor fuel, kerosene and fuel oil. A portion of the residue will be returned through the separate lines to lease areas and some of it will be used as fuel for the furnaces and boilers in the plant."

Automatic controls and modern design are features of the plant in which provision is being made for expansion. The process equipment will consist principally of fractionating towers, pressure vessels, pumps and compressors.

Subject to delivery of critical equipment now being manufactured, the plant will go into operation in September, it was stated.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Trade Agreements

IN the current discussions of trade agreements there is a tendency in some quarters to assume that the position of oil operators in all divisions varies widely, being dependent on size and scope of activities. This is not the case.

Tariff rates on petroleum imports must be considered. It is claimed that some of our larger operating units favor trade agreements which would permit importation of crude oil or products with low duties or none at all. An opposing view is that though these importers of low-cost petroleum would profit, many domestic companies or individuals would be forced to curtail or suspend their operations.

The truth is that without important exception our larger operating units as a matter of self-protection are as much interested in a sound and profitable domestic economy as are any of the medium-sized or small operators. No American company has such large foreign holdings that it could offset losses from a demoralized domestic industry with profits from outside operations. This basic condition simply reflects the fact that with this country accounting for approximately 65 per cent of the world's petroleum production and consumption, what happens here must inevitably be controlling in global oil trends.

Managements of the larger companies concerned fully realize this situation, and they will never willingly be a party to an operating program which would flood domestic markets with excess supplies.

At the same time the industry in this country should present a united front against any misconceived conservation or security plan which would restrict domestic operations through importation of large quantities of petroleum from other countries. Advocates of extensive importations argue that our own supplies may be nearing the point of exhaustion and we should conserve what we have through increased imports.

The same type of program, supported by the same reasoning, was proposed at the end of World War I. Fortunately for us and our allies, operators were permitted to continue the expansion of a virile and self-sufficient domestic enterprise. This growth played an essential part in building a strong general economy between the two wars, and petroleum was prepared to do its full part when the second emergency within a quarter century arrived.

So, regardless of what has happened or will happen in foreign fields, the continuance of a strong and aggressive domestic industry is just as important now as it ever was, and no superplanning from Washington should be permitted to circumscribe the activities of any group of operators.

This does not mean that the oil business must oppose trade agreements in which petroleum has a part. No group will profit more from "give and take" trade principles between nations than will the producers and refiners of petroleum.

Large new reserves of petroleum have been discovered outside this country in both hemispheres, and the great need of the future to assure world stability of markets will be additional outlets for these new supplies. Stimulation of economic activity everywhere through trade agreements is the practical approach to this problem, and it can be accomplished without injury to the established petroleum industry.

INTERNATIONAL

Two Refineries Proposed On Colombia Coastline

Shell Oil Co. of Colombia and Colombian Petroleum Co., a subsidiary of The Texas Co., are reported to be considering construction of two refineries on the Colombian seacoast.

Shell's plans, it is reported from Colombia, call for erection of a 70,000-bbl. plant at La Gaira, near Santa Marta, north of the Dificil pool where the company has completed its third oil producer and is starting work on two additional locations. Colombian Petroleum, according to information from Bogota, is considering construction of a refinery at Covenas on the western coast where its affiliated South American Gulf Oil Co. pipe-line terminal is located.

Dependent on Supporting Production

Construction of both plants, of course, is dependent on development of sufficient supporting production. In addition to the Casabe field, across the Magdalena River from the productive De Mares concession, Shell has developed approximate potential of 1,400 bbl. daily from the three oil wells completed on the Dificil property. The company is starting drilling operations on the sixth test and is preparing location for the seventh. The latest Dificil completion earlier this month tested approximately 300 bbl. per day of 42-gravity crude from total depth of 5,800 ft. One dry hole and a gas well have been completed on the Dificil concession in addition to the three oil producers.

The 40,000-bbl. tank in the Casabe field from which the pipe-line connection with Andian National's trunk system will take suction is being filled. Thirty oil wells have been completed in the Casabe field at depths around 3,000 ft. Crude oil is 21.5 gravity.

Standard Oil Properties in Europe Heavily Damaged

FLEMINGTON, N. J.—Properties of Standard Oil Co. (New Jersey) in Italy and France suffered severe war damage, but it is believed they can be restored to operation, Ralph W. Gallagher, president, said at the annual meeting of stockholders here.

In France, Gallagher said, the lubricating blending plant at Rouen was destroyed. The refinery at Port Jerome, in which the company has an important interest, was 40 per cent destroyed, partly by bombs and further by removal of equipment by the Germans.

"Of particular interest there," Gallagher continued, "were the signs of the apparently desperate need of the Germans for steel. They broke up concrete blocks to get the reinforcing steel and even sawed off foundation bolts down to the level of the concrete footings."

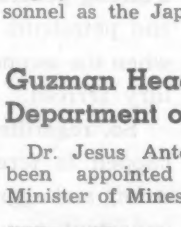
In Hungary where the company just had started a substantial producing operation prior to the war, the Germans apparently were able to increase output beyond prewar levels.

While definite information from Italy has been scant, Gallagher said properties of the company apparently suffered substantial damage from bombing. Information from Romania has been meagre but "we have hope that our producing properties there are in reasonably good condition."

The company has no advice about the large refinery at Palembang, Sumatra, in which it has a 50 per cent interest, but the plant very largely was destroyed by its personnel as the Japs approached.

Guzman Heads Colombian Department of Petroleum

Dr. Jesus Antonio Guzman has been appointed Colombia's new Minister of Mines and Petroleum to succeed Dr. Nistor Pineda, who tendered his resignation early in May.



Dr. Guzman is an attorney by profession; has served as a member of the House of Deputies of his native State of Cauca, secretary and governor of the state, member of the Colombian Congress, secretary of Colombian Legation in Panama, legal adviser to the president of the republic, and attorney for the Banco Agricola Hipotecario and university professor.

Ecuador's Crude Output for Quarter 27,393,324 Gal.

WASHINGTON.—Net production of crude petroleum in Ecuador during the first quarter of 1945 was 27,393,324 gal. Although under the figure for the fourth quarter of 1944, which was 30,261,084 gal., it was larger than that for the first quarter last year, 26,834,472 gal.

The total amount of products refined during the first quarter of 1945 was less than for the corresponding period of 1944. The decrease was not uniform for all products, as indicated in the following table:

Product—	First quarter 1944	First quarter 1945
Gasoline	2,122,683	2,119,840
Slops		164,438
Benzine	84,662	
Gas oil	13,652	11,340
Kerosene	545,619	795,340
Diesel oil	1,112,552	1,138,853
Lubricating oil	25,800	26,108
Residue	6,774,348	4,683,910
Total	10,679,316	8,939,834

During the quarter 618,235,000 cu. ft. of natural gas was processed, producing 403,177 gal. of gasoline net.

Mexicans Protest Against Hiring American Drillers

MEXICO CITY.—Mexican oil-well drillers have presented to the government a protest against employment of drillers from the United States in the nationally administered industry. They alleged that though they themselves are paid $204 a month, the Americans get $500 and housing.

The Mexican drillers said the petroleum administration admitted the wage differential had been in force since 1944, but that the situation would be investigated.

Second Aruba Refinery Resumes Operations

Operations have been resumed at Arend Petroleum Maatschappij refinery, Aruba, Netherlands West Indies, after a shutdown of 2 years. The plant is a topping, cracking and reforming operation with capacity of about 10,000 bbl. per day.

A. Bronkhuizen is plant manager, R. H. Childs is superintendent and M. Flury is head stillman.

Peruvian Blue Goose Now Exporting Oil to Brazil

LIMA.—Peruvian Ganzo Azui (Blue Goose) Oil Co. has begun shipping oil and refined products to Brazil from its Aguas Calientes field, in the upper Amazon Basin. The first shipment, made in three Peruvian River tankers, consisted of 84,000 gal. of gasoline; 41,182 of kerosene, and 20,000 of diesel oil, all representing surplus quantities after supplying regional needs.

Senate Group Challenges Report Of Carbon-Black Survey

WASHINGTON.—The statement of the War Production Board that the carbon-black situation has materially eased was strongly challenged by the Senate war investigating committee June 11 at a hearing at which Fred M. Vinson, director of the Office of War Mobilization, was asked to explain why he disbanded the interagency carbon-black committee.

Chairman Mead suggested that these actions were taken for the purpose of embarrassing his committee which is about to issue a report presumably castigating WPB for the carbon-black shortage which has held down tire production. He hinted that large producers have been influential in preventing independents from obtaining priorities to build new plants and introduce new processes.

Orville B. Judd, associate director of the fuel division, Office of Price Administration and a member of the interagency carbon-black committee, told the Senate group that on May 28 the committee heard a rumor that WPB intended to lift restrictions on carbon-black use in golf balls and other articles and uanimously voted to instruct its chairman to inform WPB Chairman J. A. Krug that the situation is still very critical and no relaxation should be permitted. However, on June 1 the committee saw a WPB announcement that carbon black is no longer short and restrictions on its use had been lifted so it voted to dissolve on the ground that its usefulness had ended. Judd said the situation is still critical and there will be a shortage of 14,000,000 lb. of carbon black during the third quarter.

J. M. Deutsch of OWM staff, chairman of the interagency committee, admitted on the stand that he did not protest to Krug but was told by lesser WPB officials that the carbon-black situation was all right so he figured nothing more needed to be done.

Vinson told the senators he discharged the committee with thanks after Deutsch told him carbon-black production had increased 43 per cent and WPB had lifted restrictions.

Senators Mead and Ferguson, however, brought out by questioning that the shortage had been ended not by increasing carbon-black production but because of an anticipated cutback in military tire requirements, that there would not be enough black for civilian tire production, that inferior degraded tires with insufficient black are still being shipped to the front, and that WPB has not speeded construction of new production facilities although it has stopped the program of enriching gas with butane and other costly ingredients.

Mead said a new and different committee should be set up to supervise the carbon-black program and indicated that his committee will publish its report shortly.

Oil Executives Present Frank Phillips With Weird Trophy

(Frank Phillips, the Oklahoma oil millionaire, was, and still is, a prospector. To prove it recently he invited William E. Boyd, Jr., and Ralph K. Davies, the two top and high-powered oil executives now serving the war effort in the nation's capital, to come to his Woolaroc Lodge for a change and a rest. How Woolaroc took the change and some stranger took the rest is told in the following account of the result of these two executives' efforts to find a suitable token of appreciation for their host.)

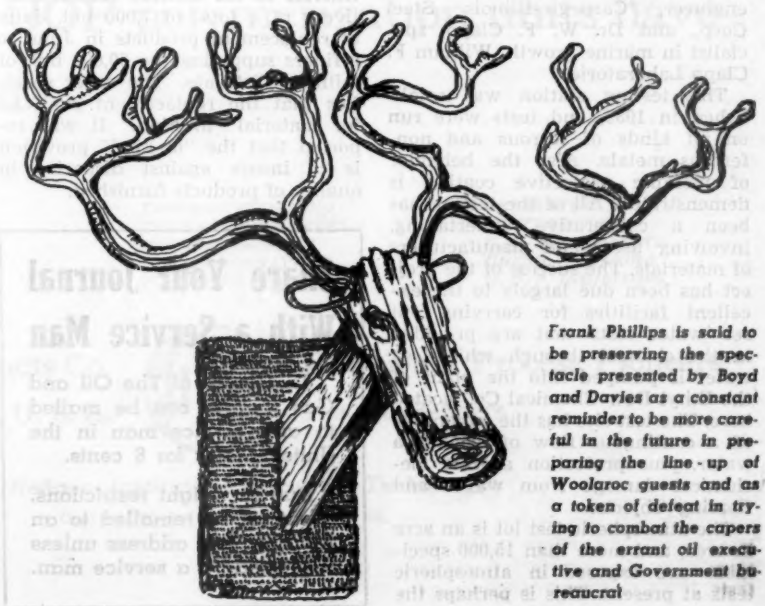
WOOLAROC ON THE LAKE, Okla.—The science of natural history has been set back a thousand years by the diabolical discovery by two of the nation's leading leaders of oil men of a sorry species of bark-faced, rope-eared Emanon, a rarity considered very pleasantly extinct until wanderlust overwhelmed its finders.

The amphibolous atrocity, the Emanon might, it is believed, supply the missing link between the riff and the raff of the animal kingdom assembled at the Woolaroc wonderland of carnivorous curios.

Naturalists in the know on such subjects see in the Emanon the most amazing discovery in Oklahoma since the Broadway stage hit of the same name. Other unscientific sources avidly agree that the appearance at this time of the Emanon (Emanon spelled backwards is no name) is the most convincing argument yet found for keeping a certain oil executive and a particular government bureaucrat at their respective desks in Washington.

Under the most unlikeliest of circumstances—somebody talked—did it become known that the Emanon now occupies a high place of horror in the trophy room of fabulous Woolaroc Lodge, a rambling redoubt where Frank Phillips, the one-time Iowa country boy and Oklahoma banker, maintains a private clinic for the conservation of unpalatable portions of the carcasses of animals seldom seen this side of a zoo or a circus.

If the Emanon was ever an animate animal, both Boyd and Davies, the donors, agree with Frank Phillips, the unwilling donee, that it would have been a wanton waste of skin and bones, in all probability as meatless as the corner butcher and no more ferocious than a



Frank Phillips is said to be preserving the spectacle presented by Boyd and Davies as a constant reminder to be more careful in the future in preparing the line-up of Woolaroc guests and as a token of defeat in trying to combat the capers of the errant oil executive and Government bureaucrat

smoked turkey. Its habitat, they believe, could have been only the fiction of some wacky explorer's dream or the figment of a frustrated travel lecturer. To produce offspring, they said, the Emanon would require the assistance of a couple of careless carpenters and an ambitious beachcomber, all three suffering from acute cases of screaming-meanies superinduced by sunstroke and cholera. Then, they added, only time could tell whether the newborn Emanon would walk, fly or float—or refuse to do any of these.

Both Boyd and Davies stoutly decline to disclose the locality where they unearthed this skeleton of baffling bric-a-brac because, they avow, the next time they are down Woolaroc way (if, indeed, they should ever be invited again), they plan to present Phillips with the head—mounted—of the man who made the Emanon.

Technical Editors Visit Corrosion Project

WILMINGTON, N. C.—Salt-water corrosion was observed and discussed during the 2-day visit of a group of technical editors at the Marine corrosion testing station on Kure Beach, June 5-6. A great many alloy steels, magnesium alloys, and nickel alloys that have been in test for long periods of time were viewed. The use of magnesium for cathodic protection of steel piling and salt-water lines was shown.

Participating in the discussions were F. L. LaQue, in charge corrosion engineering section, The International Nickel Co., Inc.; J. A. Peloubet, development engineer, magnesium division, Dow Chemical Co.; Ewart S. Taylerson, research engineer, Carnegie-Illinois Steel Corp., and Dr. W. F. Clapp, specialist in marine growth, William F. Clapp Laboratories.

This testing station was established in 1935, and tests were run on all kinds of ferrous and nonferrous metals. Also the behavior of metallic protective coating is demonstrated. All of the testing has been a cooperative undertaking, involving users and manufacturers of materials. The success of the project has been due largely to the excellent facilities for carrying out sea water tests that are provided in the channel through which sea water is pumped into the plant of the Ethyl Dow Chemical Co. located here. The test site has the advantage of a continuous flow of clean sea water, plus protection against mechanical damage from waves and floating objects.

The atmospheric test lot is an acre in area, and more than 15,000 specimens are exposed in atmospheric tests at present. This is perhaps the largest number of specimens on test at a single station anywhere in the world. About 2,000 specimens are exposed to sea water and during the past 10 years over 4,000 specimens have been so tested.

Gulf Coast Refiners Decry Tax-Exempt Cooperatives

HOUSTON.—Gulf Coast Refiners Association, recognizing a growing trend "toward tax-exempt cooperative forms of business," which "lead to the curtailment of opportunities to engage in private enterprise," has sent to the joint committee on internal revenue in Washington a resolution adopted by the association, condemnatory of the tax-free feature of cooperative projects.

The resolution declares that cooperative forms of business should be "subject to the regulations of private business, including federal tax laws, with the requirement that undistributed dividends, or reserves, or profits of the cooperative forms of business be taxed on the same basis as the currently prevailing corporate income tax rates."

Refiners to Continue War Program for Distillates

CHICAGO.—Refiners of District 2 (Middle West) have received from Petroleum Administration for War a directive to continue through June, and indefinitely thereafter, their schedule of supply of military distillate. This schedule calls for a total of approximately 50,000 bbl. daily of 7-0-2d diesel and Pool 21 gas oil from 46 refineries.

Another directive, sent to 28 refineries in the district, requires delivery of a total of 7,000 bbl. daily of replacement products in June to refiners supplying the 50,000 bbl. of military distillate. The order specifies that the replacement shall be for material "in kind." It was reported that the "in kind" provision is to insure against disparity in quality of products furnished.

Share Your Journal With a Service Man

This issue of The Oil and Gas Journal can be mailed to any service man in the United States for 6 cents.

Due to weight restrictions, it cannot be remailed to an APO or Fleet address unless requested by a service man.

DEATHS

J. R. Givens, 35, Houston, sales engineer for The Tretolite Co., died May 29 from injuries suffered in an automobile accident. He formerly represented The Dehydro Co. in western Kansas.

Barton P. Sibole, 57, Tulsa, president of Stanolind Pipe Line Co., died June 6. Following his graduation in mechanical engineering at University of Pennsylvania in 1911, Sibole held various positions in the East, going to Tulsa in 1920 as assistant to S. C. Phillips, head of Sinclair Oil & Gas Co. motor transport department. The next year, when Standard Oil Co. of Indiana acquired half ownership of Sinclair Pipe Line Co., he was made assistant to John R. Manion, president of the latter organization. In 1930, when Standard bought the other half interest, Sibole became vice president of Stanolind Pipe Line Co., as the system then was named. He was made executive vice president in 1940 and president in 1942.

Howard L. Warren, 60, retired oil operator, died June 3 in Houston. He was a Harvard University graduate.

Alexander J. Clark, 63, for 18 years superintendent of Coast Petroleum Co., died June 4 in Houston.

Lt. Comdr. David Lindsay, 41, civil engineer and representative of Shand & Jurs Co. in Houston when he entered war service in 1942, met death by drowning May 27 in the Philippines. He was serving in the Civil Engineer Corps.

Ernest Carroll, for 20 years assistant to the vice president of The Texas Co. in Houston, died June 4 at his home in Sonora, Tex.

Roy McKean, production superintendent for Compania de Petroleo Shell de Colombia, with headquarters at Casabe, Barranca Bermeja, died May 11 and was buried at Bogota. He formerly was employed by Carribbean Petroleum Co. in Venezuelt.

Malcolm J. Monroe, 62, retired sales manager of Humble Oil & Refining Co., died unexpectedly June 7 at his ranch, near Uvalde, Tex.

Floyd G. White, 64, retired oil operator, died June 1 in Los Angeles.

Patrick H. Gibbons, 85, retired gas engineer, died June 6 in West Chester, Pa.

Raymond H. Mozier, 54, assistant general sales manager for Tide Water Associated Oil Co., Tulsa, died June 11 from a bullet wound. He had suffered from a nervous ailment.

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CATALYTIC REFORMING
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Universal Oil Products Co.
Chicago 4, Ill., U. S. A.

UOP

Petroleum Process Pioneers
For All Refiners

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Stainless Steels Minimize Corrosion in Processing Sour Crude Oils

by R. B. Tuttle

The topping - vacuum - cracking plant described here operates on West Texas crude for 20 consecutive days and on Mid-Continent for the remaining time of a 30-day period. Recent inspection findings show that metal losses in equipment increase to a maximum at the heavy gas-oil cracker. A loss of 25 per cent in 6 months was found in the 4-6 Cr condensate line of the vapor separator.

SINCE the last quarter of 1944, Wood River Oil & Refining Co. has been operating its refinery at Hartford, Ill., on a 100 per cent West Texas crude charge for 20 consecutive days out of each 30-day period. For the remaining 10 days of the period, operations are carried out with a charge of 100 per cent Mid-Continent crude.

The sweet crude processed by this plant is delivered via barge to the company-owned docks nearby on the Mississippi River, and by pipe line, and the West Texas crude is delivered via tank car to the refinery. Crude storage, adjacent to the process area, provides space for keeping the two crudes separated at all times.

Fig. 1—(Left) The section of 4-in. carbon steel pipe on the right was removed from a line which was handling gas-oil at 625° F. On the left a section of new schedule 80 pipe is shown for comparison

Prior to topping, each crude is processed in the same manner by adding water and heating the mixture to about 280° F. and settling the water out at 200 psi. This treating operation which is carried out for the removal of salt and other undesirable materials also includes the addition of Tret-O-Lite to the pumped stream. Crude leaving this phase of the process passes on to a bank of exchangers where its temperature is raised to about 425° F., at which temperature it is fed into a crude debutanizer. Overhead from the debutanizer goes into the cracked gasoline stabilizer and the bottoms to the topping section of the unit. In the changeover from sweet to sour or from sour to sweet crudes, operational adjustments in the processing equipment are carried out in a matter of minutes by the operators. During the balancing-out period in the process, after changeover, the volume of slop is negligible and seldom exceeds that ordinarily met with in normal operations of a combination topping-vacuum-cracking unit.

The furnace in which the topping coils are installed is arranged to supply heat for both topping and vacuum sections of the unit. Crude enters the topping-coil convection bank in parallel-series flow and leaves this section of the coil in two streams. One stream, that which leaves the lower section of the split convection bank, passes on to the radiant bank roof tubes where the headers likewise are arranged for parallel series flow. Crude from the upper section of the convection bank flows to side-wall radiant tubes. The two streams are brought together into a common line on the outside of the heater and thus are conveyed to the atmospheric fractionator at a temperature of about 640° F. Consisting only of radiant tubes the coil for the vacuum section receives its heat from a group of burners separate from those used for supplying heat for the topping coil. Combustion gases from the two sections of the furnace enter a common duct which contains the convection tubes of the topping coil. A double-bridge wall near the center of the furnace forms the gas-exit duct.

Straight-run gasoline, naphtha, kerosene, and a light gas-oil are the

Fig. 2—Cast-iron sections of a Winkler-Koch bubble deck. The section in the rear has been discarded because of the extent of corrosion. For comparison a new section is shown in the foreground

normal products taken off at the atmospheric fractionator and side-stream strippers. Bottoms from the tower are run through the vacuum-section heating coil and thence to the fractionator which operates at a reduced pressure of about 40 mm. Hg. Overhead and side streams run to cracking stock and the bottoms to fuel stock. Cracking of a light and of a heavy gas-oil is carried out with a conventional type Winkler-Koch unit. The furnace, arranged with two independent coils, is similar in design to that of the topping-vacuum section. Two sets of coils located in the duct formed by two bridge walls at the center of the furnace make up the separate convection banks for the two cracking coils. The balance of each coil is composed of floor, roof, and side-wall tubes. The major pressure vessels for the cracking section consist of a vapor separator, pressure-distillate bubble tower, tar flash chamber and gas-oil accumulator Reforming and cracking of light gas oil or naphtha is carried out in another heater using the same fractionating equipment. In general, the furnace is similar to the double cracking-oil furnace except that its coil is arranged to heat but one charging stock for a specific operation.

Severity of Corrosion

Constructed over 4 years ago, the refinery was equipped to operate on Mid-Continent and Illinois crudes which at the time were available in ample quantities, therefore full provisions for handling crudes of a higher corrosive nature were not incorporated into the plant's design, although the vapor separator and cracking plant bubble tower were lined with 11-13 per cent Cr. However, subsequent conditions have brought about the installation of corrosion resisting items in the process zones where corrosion is most severe. In handling its quota of sour crude Wood River Oil & Refining Co. has taken steps to forestall probable failure of such equipment items as are not resistant to corrosive action, by continuously inspecting all equipment that operates in corrosive service. Recent findings of inspectors indicated that certain carbon-steel pipe lines were approaching the limits of safety, for which reason, plus that of the desirability to inspect other parts which could not be made while the plant was in operation and to clean the over-all plant, the unit recently was shut down to carry out this work. An indication of the severity of corrosion met with at this plant is illustrated in Fig. 1 which shows a section of carbon-steel pipe as removed from a 4-in. pipe line that was handling gas oil at around 625° F. and a section of new Schedule 80 pipe which originally

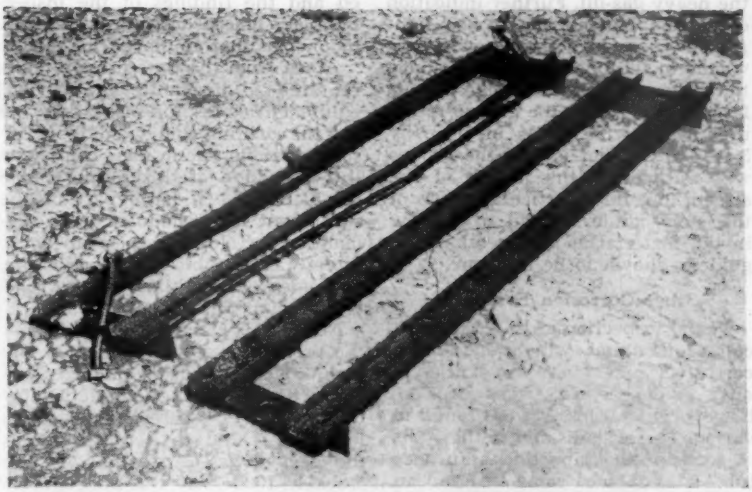


Fig. 3—The condition of the bubble-cap anchors as taken from one of the fractionators. Both anchors have been in service for the same length of time but the section on the left was removed from a zone of higher corrosion

Fig. 4—Pressure control valve bonnet assemblies

was the weight of the corroded section. Because of increased throughput rates velocities in this line run slightly over those normally found in similar services which, in this case, is the supplying of heat to a bank of crude-preheating exchangers. Fig. 2 gives a comparison between new and eroded sections of standard Winkler-Koch cast-iron bubble decks. To what extent recent operations have contributed to the corrosion of the decks is indefinite but it is believed that in the past 5 to 6 months loss of metal is nearly equal to the losses in previous operations. Shown in Fig. 3 are two sets of bubble-cap anchors which are made of small, carbon steel, channel sections. These anchors are located above the liquid on the bubble-cap deck and serve to hold the caps in position above the deck risers; both anchors have been in service since the plant was built.

In Fig. 4 is shown the stem and bonnet assembly of the pressure-control valves for light and heavy gas-oil cracking coils. All parts of these valves are made of 4-6 Cr. and were in service for several months before the refinery began operating under present schedules. The assembly on the left, which operates in heavy gas-oil cracking service, shows severe pitting of the stem guide, whereas the other assembly has a relatively smooth surface on this part of the valve. Both of these valves were dimensionally identical when installed and except for the condition of the stem guides show a marked similarity to the other surfaces which were exposed to corrosive action. It is of interest to note that the depth of the pits in the one stem guide equals the depth of erosion in the other guide. It is believed that higher turbulency in the light-gas-oil valve is responsible for the uniformly eroded area and because of this condition the corrosion rate was increased as the light gas-oil is indicated to be less corrosive than

the heavy gas-oil. Further indication of extreme turbulency in the light gas-oil valve is a groove which is visible in the photograph just above the lower end of the guide. At its largest dimensions the groove measures ⅜ in. wide by ⅛ in. deep by 3 in. long. Belief is that the groove was formed by the jetting of the stream on this particular area of the stem guide instead of a flaw in the material as the metal in the guide is shown to be uniform.

Other Corrosion Evidence

Visual inspection of the other miscellaneous items which operate in corrosive zones revealed little, if any, evidence of serious erosion; however, metal losses were found in various vessel shells and in the walls of some of the pipe lines. Furnace tubes also showed some loss and an indication of slight corrosion was found in an isolated group of several tube headers in the roof section of the light gas-oil cracking coil.

Wall-thickness measurements of pipe lines and of pressure vessels are made by drilling a small hole through which a special type of direct reading caliper is inserted. After the thickness reading is taken, all holes are plugged and welded. For record purposes all gaging holes are identified by a code number.

Records of all measurements are maintained in the files of the refinery by the engineering division. These records include the measurements of metal thicknesses where and when made and their relationship to previous measurements as indicated on a detailed drawing of the specific equipment item. Layout drawings of all pipe lines show where and when thickness measurements were made. A schematic layout of all tube banks, wherein each tube is assigned an identifying number, is used for recording still-tube inside diameters which are taken at different points throughout the tube's length. Terminal fittings and headers are given a very close examination and where an indication of corrosion is found, the particular item is calipered, its wall thicknesses recorded, and its location referred to the tube identifying numbers as shown by the layout drawing for the particular still. Subsequent measurements will give an indication of rate of corrosion for a previously calipered fitting. All valves including checks, motor valves, and the like are handled in a similar manner to that used to check still-coil fittings. However, in the case of valves the records are carried further by the use of a phantom drawing which shows all of the important internal parts of the particular valve and the location of the points where the measurements were made. Centrifugal, reciprocating, and all other pumping equipment is inspected and the findings of the inspections are placed on records in a like manner as that employed for valves.

Apart from the time in man hours required to dismantle the various equipment items for inspection and for the drilling and welding of inspection holes, four men completed the inspection of this refinery in 6 days. Because a large part of the equipment was scheduled to be dismantled for cleaning the man hours directly chargeable to inspection, for equipment dismantling, ran to relatively small figures.

No metal losses were found in the processing equipment up to and including the crude debutanizer but from the atmospheric fractionator on through the cracking sections losses increased to a maximum at the heavy gas-oil section of the cracker. Losses at the atmospheric column showed to be most severe at the inlet section where the inlet stream impinged upon the shell of the vessel; at this point losses ran to about 300 per cent greater than the average for other sections. From the inlet section upward metal losses decreased to negligibility in the first side-stream section and below the inlet, losses averaged around 150 per cent over those in the upper sections of the vessel.

Topping Coil

In the topping coil which is made up of 4-in. o.d. by 3¼-in. i.d. carbon steel tubes and headers, metal losses in the tubes ran from 0.01 to 0.10 in. on the inside diameter with the maximum in the bottom row of roof tubes. Headers and terminal fittings in this coil as well as the transfer and tower lines showed no evidence of corrosion. The heating coil for the vacuum still is made of 4-6 Cr. which was installed during the latter part of last year; no evidence of corrosion was found in this coil. Lined with 11-13 Cr. up to the heavy gas-oil section the vacuum column was reported to be in excellent shape with no metal losses in the unlined sections. Slight losses were found in the carbon-steel product lines in the colder part of the vacuum section of the unit but the over-all condition of the equipment at this phase of the process was considered to be normal. The transfer and high-temperature product lines are all 4-6 per cent Cr. in this vacuum section.

Because previous measurements were not available, losses, if any, in the walls of the 4-6 Cr. headers of the heavy gas-oil cracking coil could not be determined. The roof tubes of this coil show losses of from 0.01 to 0.03 in. on the diameter of the bottom row. Metal losses in the other tubes in this coil are reported as negligible; all tubes are 4-6 Cr.

No losses at the light gas-oil coil are indicated at this time and as the tubes and headers are of 4-6 Cr. no measurable loss is anticipated for some time. All pipe lines in the cracking area are 4-6 Cr. as are the valves and fittings within the area. With the exception of the condensate line from the vapor separator, little if any loss was found in any of the lines. The condensate line at the vapor separator is 4-6 Cr. pipe that has been in service for about 18 months. No losses were evident in this line until within the past 5 or 6 months, during which time the pipe walls have shown a loss of 25 per cent; this line is 3-in. pipe size with an original wall thickness of 0.18 in.

During the recent shutdown at this plant various steps were taken to reduce metal losses in some of the equipment which previous inspection indicated to be in the higher loss brackets. The major part of this work consisted of the lining of the bottom section of the atmospheric bubble tower with ganister, replacing carbon steel with 4-6 Cr. material for the pipe line which carries hot gas-oil to the bank of exchangers that preheat the crude charge for the unit, and the installation of stainless steel bubble decks in the pressure distillate tower. Indications are that current alterations to the equipment operating in corrosive zones will go a long way in reducing future metal losses. However, present plans call for another thorough checkup on the unit later this year at which time such additions as are necessary to make the equipment corrosion resistant in those zones as may develop in the meantime will be made.

R. C. Nicholson has been named superintendent of oil movements for Shell Pipe Line Corp., with headquarters in Houston. He will have general supervision of oil schedules, tenders, field gaging and line dispatching. **G. H. Miller** was named supervisor of oil schedules and tenders, assisting Nicholson. **L. F. Franklin** was named chief dispatcher in the West Texas-New Mexico area, with headquarters at Colorado City, Tex. Other chief dispatchers are **U. W. Clark,** Mid-Continent area, at Cushing, Okla.; **M. A. Leonard,** Texas Gulf area, at Houston, and **S. V. Maloney** of Bayou Pipe Line System, at Houston. The promotions followed the retirement of **Ben L. Browne,** chief dispatcher in the head office, and **Tom J. Madden,** chief dispatcher in the West Texas-New Mexico area, each with about 27 years' service. Madden, nearly blind, and eligible to retire at age of 60 in December 1941, elected to serve in his important position until after V-E Day.

L. L. Baxter, Fayetteville, Ark., has been elected president of Arkansas Western Gas Co.

Four Pennsylvania Refiners Operate Joint Aviation-Fuel Plant

Pennzoil Plant No. 3, including laboratory and office (left foreground), boiler plant (left background), alkylation unit, gas-concentration unit, and pressure and atmospheric storage

by Paul Truesdell and W. E. Lemen*

THE 100-octane-number aviation-fuel plant at Oil City, Pa., which is turning out 50 per cent more aviation gasoline than originally designed for, is the outgrowth of a cooperative cracking program which started in 1931. In that year four companies, Pennzoil Co., Quaker State Oil Refining Co., Wolf's Head Oil Refining Co., and Continental Refining Co. built and began operating a community Dubbs thermal-cracking unit, Pennzoil being charged with the duty of its operation.

The threat of war induced the cooperating companies to decide in October 1941, just prior to Pearl Harbor, to build a catalytic-cracking unit under the same general plan as had been used for the thermal cracker. This unit was built at the expense of the cooperating companies, amounting to about $2,000,000 including auxiliary facilities. At the same time Defense Plant Corp. contracted to finance and build an alkylation unit, gas-concentration unit, etc., thus making a complete aviation-fuel plant of the venture, and contracted with Pennzoil to operate these facilities along with the catalytic cracker owned by the four companies. These latter facilities cost about $3,000,000. Direction of the responsibility for the project devolved on D. W. Grant, vice president of Pennzoil.

Experience gained in operating a community thermal-cracking unit induced these four refiners to undertake financing, building, and operating a catalytic cracker. Combining a DPC-owned alkylation unit and other auxiliary equipment with the catalytic-cracking installation enables these refiners to produce 50 per cent more aviation 100-octane-number fuel than the setup was originally designed for. A thermal-cracking unit was redesigned, and furnishes part of the charge stock for the alkylation unit; catalytic recycle stock is recracked in the thermal unit. The entire plant is making more than 2,000 bbl. per day of aviation fuel from 4,500-5,000 bbl. per day of fresh crude charge.

Main Pennzoil Refinery

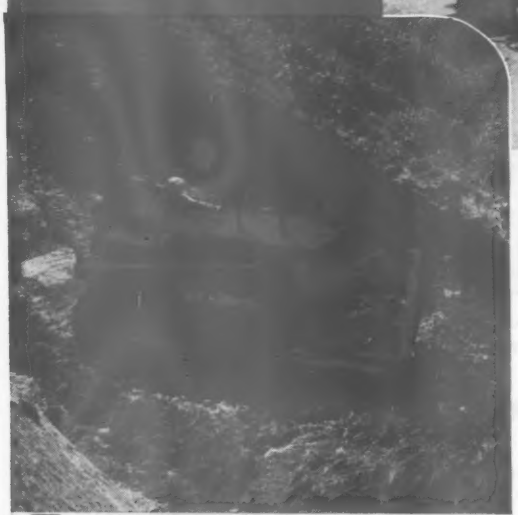
At the time the joint aviation-gasoline plant was projected, Pennzoil was producing from Pennsylvania crude at its No. 1 plant the following products: S.R. gasoline, kerosene, light gas oil, wax distillate, and steam cylinder stock. In October 1942, ground was broken for the aviation-gasoline plant. It was a combination conversion and new construction job. Universal Oil Products Co. was the designer and licensor of the processes, and Arthur G. McKee & Co. was the engineering contractor.

The new catalytic cracker was placed in Plant 2, where Dubbs Nos. 3 and 4 and the polymerization units are located. Plant 3, also called the DPC plant, is ⅓ mile north of Plant 2. It contains the gas-concentration unit, the HF alkylation unit, and the necessary utilities, including a new cooling tower, a new boiler plant and complete facilities for inhibiting, ethylizing, blending, storing, and shipping aviation gasoline.

*Universal Oil Products Co.

Low-Cost Power...

Shown above and left below, are typical installations of International Power Units powering pumps. At left is the big International TD-18 Diesel TracTracTor building a road in the oil country.



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International Power Units are available in four carburetor models and four Diesel models. The carburetor-type power units operate on gas as well as gasoline. International TracTracTors, full-Diesel and carburetor type, are powerful, rugged crawlers which have proved their dependable performance everywhere and have been doing a great job on the war fronts. Industrial Wheel Tractors are built in Diesel and carburetor models for a wide variety of work.

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Everything in Plant 3 was financed and is owned by DPC.

Thermal Cracker Converted

Dubbs No. 3 thermal-cracking unit was the starting point in the war-conversion program. This unit is the first UOP thermal-cracking unit ever to be tied into a catalytic-cracking operation. The fractionator was found to be of suitable size to serve, with minor changes, as the fractionator for the catalytic cracker. So it was moved and placed in a service which requires an operating pressure of only 5 lb. A new tower designed for 90-lb. pressure was installed on the thermal cracker.

It was evident that under the new scheme the only material available for thermal cracking would be catalytic cycle stock, amounting to 1,500-2,000 bbl. per day, and straight-run gasoline.

The original two-cell heavy-oil heater of the thermal cracker, a 45,000,000-B.t.u./hour furnace, had sufficient capacity to handle all the catalytic cycle stock. Two-coil operation is carried out by merely separating the coils, using one side for light and one for heavy oil. The light-oil heater, a 30,000,000-B.t.u./hour furnace, was thus released for use, without being moved from its original location, as a heater for catalytic-cracker feed.

A UOP center-wall updraft reforming heater, of 3,500 bbl. daily capacity, was added, so that the reforming of straight-run gasoline and cracking of cycle stock could be done in a single unit. The remodeling of the thermal cracker was carried on so that its operation was interrupted for only 2 months.

This thermal unit is cracking about 1,600 bbl. per day of cycle stock and 2,500 bbl. per day of straight-run gasoline. The gasoline comes from the refineries of the four co-operating companies.

The cycle stock is pumped directly from the fractionator of the cat cracker into the thermal-cracker fractionator, which operates at a top temperature of 370° F., bottom temperature of 615° F., and 93 lb. pressure. Heavy combined feed from the bottom of the fractionator is charged to the heavy-oil side of the heater and light combined feed, as a side cut from the fractionator, is charged to the light oil coil.

Heat is recovered from the fractionating column by circulation of side cut and bottoms through steam-generating heat exchangers, which together produce 18,000 lb. per hour of 125-lb. steam.

The heavy-oil stream leaves the heater coil at a transfer temperature of 915° F. and goes into the top of the reaction chamber which operates at 375 lb. pressure. The light-oil stream leaves the coil at 945° F. and joins the heavy-oil stream at the reaction chamber outlet, ahead of the pressure control valve.

Vapors from the reformer, leaving the heater at transfer temperature of 975°-1,000° F. and at a pressure of 500 lb., are quenched with light oil to a temperature of 800° F., passing through a pressure-control valve and joining the other streams at the primary flash chamber inlet.

Overhead from the primary flash chamber enters the fractionator at a point below the inlet of the cycle stock. Primary flash-chamber bottoms go to a secondary flash chamber operating at 30 lb. pressure and 525° F. temperature. The overhead material from the secondary flash chamber is used as transfer quench and flash chamber reflux. Bottoms from the secondary flash chamber, black fuel oil of 10°. A.P.I. gravity, represent about 10 per cent of the gasoline-cycle stock charge.

Overhead From Fractionator

Overhead from the fractionator goes to a receiver where liquid and gas are separated. A two-cycle 200-hp. gas-engine-driven Clark unit compresses the gas from 90 to 225 lb., and delivers them to the de-ethanizer of the gas concentration system for the recovery of C_3 and heavier hydrocarbons.

Unstabilized gasoline from the receiver goes to a pair of stabilizers operating in parallel as a debutanizer. The overhead condensate is charged to the depropanizer of the gas concentration system. The bottoms are debutanized motor gasoline fractions. The butylenes and isobutane recovered make up a part of the charge to alkylation.

Catalytic naphtha from the bottom of the rerun column of the gas-concentration system, and motor polymer when available, are blended with the thermally cracked and reformed motor gasoline and its vapor pressure is raised to specifications by the addition of normal butane recovered from the thermal and cat-

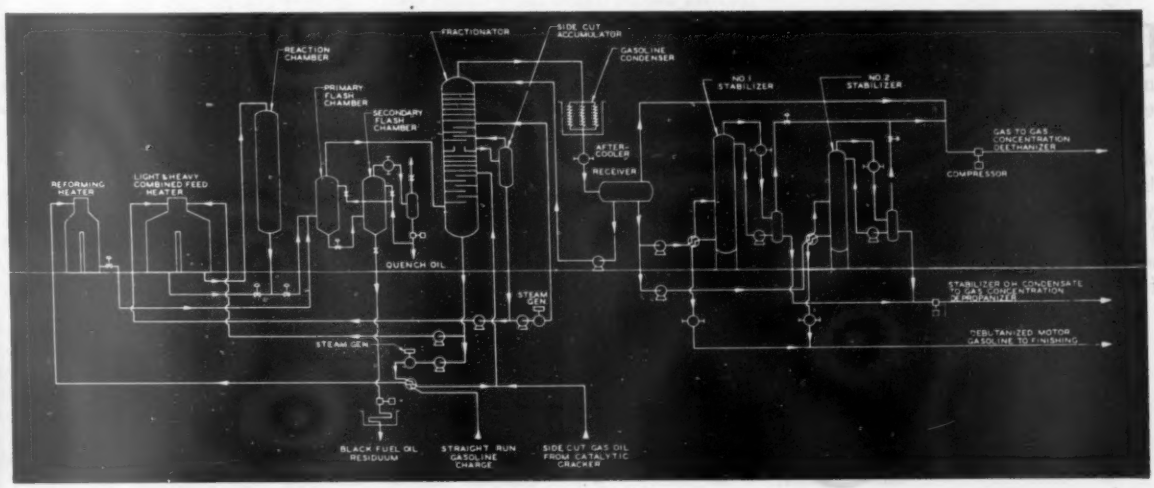
FEED TO THERMAL CRACKER

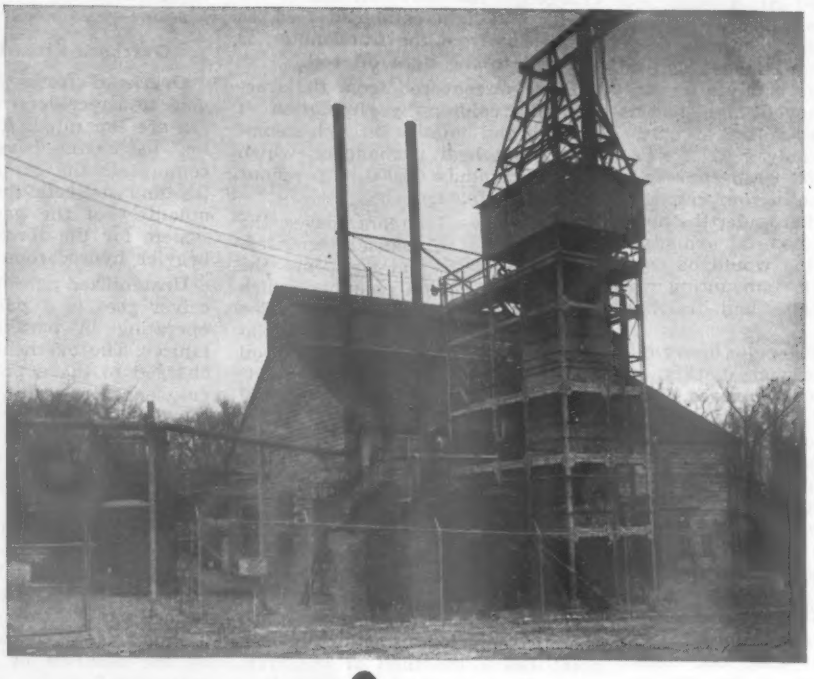
Straightrun gasoline	360 e.p., 52 octane number
Catalytic cycle stock	36°-37° A.P.I. gravity, 400° F., I.B.P., 650° F. e.p.

PRODUCTS FROM THERMAL CRACKER

	Vol. %	Bbl./day
Motor-gasoline fractions, 400° F. e.p., 64-65 octane rating, 5-6 lb. R.v.p.	72-77	2,900-3,100
Butylenes	5	200
Isobutane	1.5	60
Bottoms	10	410
Gas	9-12	....

Flow diagram of Dubbs No. 3 unit, combined gas oil cracking and reforming





The High and Low of it

IF there's any need for hydrogen of high purity, it's for the hydrogenation of vegetable oils. And if there's any need for high purity hydrogen at low cost, it's in the vegetable oil business!

Traditionally, these two objectives were incompatible. It isn't really so. By dispensing with an existing plant in favor of the Girdler hydrocarbon reforming hydrogen plant pictured above, an eastern manufacturer of vegetable oil products made it possible for himself to get very pure hydrogen at a saving, in his particular case, of 60% in operating cost alone.

The Girdler process is economical because it operates efficiently on a continuous basis—at any percentage of the rated capacity from 20 to 100 per cent. Virtually automatic, it saves labor. It is a clean process, and eliminates the dirty, hot task of cleaning blue gas generators. It produces a valuable by-product—pure carbon dioxide.

Girdler hydrogen plant engineering ability is backed up by versatile, practical experience with other processes for gas manufacture, purification, separation, and dehydration. Consult us on your problems concerning hydrogen sulphide, carbon monoxide, carbon dioxide, natural gas, refinery gases, liquid hydrocarbons, hydrogen, nitrogen. Originators of the Girbotol Process.

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alytic BB fractions and separated in the debutanizer of the alkylation unit.

Dubbs No. 4 thermal cracker is now employed by Pennzoil alone as a standby for motor-fuel production, being used to crack excess gas oil or kerosene or to reform excess straightrun gasoline.

The catalytic polymerization unit was modified so that it could process the gas-concentration depropanizer overhead to produce motor polymer. The depropanizer overhead and the normal butane stream from the alkylation unit debutanizer were combined in the poly-unit feed drum, providing a liquid feed which can be processed without extensive alterations to the existing equipment. Normal butane thus recovered is combined with the debutanized motor gasoline components along with the polymer.

The Catalytic-Cracking Unit

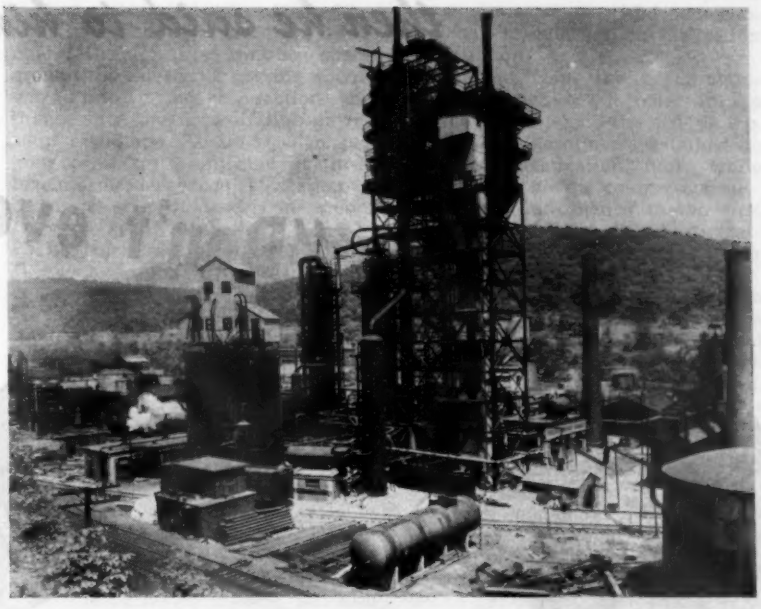
Aviation-fuel components are base stock, alkylate, and isopentane. The catalytic cracker produces all the base stock, most of the isopentane, and the greater part of the isobutane and butylenes which go to make up alkylate. In one method of operation, the cat cracker has produced from a virgin feed of 4,300 bbl. a day, these vital products:

	Bbl.	Vol. %
Depentanized 330° F. end point base stock	875	20.3
C_5 fraction	460	10.7
Butylenes	325	7.5
Isobutane	460	10.7
Total	2,120	49.2

The 4,500-bbl. daily design capacity of the catalytic cracker was based on a charge composed of 3,900 bbl. of gas oil of 39°-40° A.P.I. gravity and 600 bbl. of kerosene of 45° A.P.I. gravity. Under these conditions the catalytic-cracking unit has demonstrated its versatility. When sufficient fresh feed stock was available, the unit has cracked as much as 5,000 bbl. per day. It has run on charges ranging from straight gas oil to mixtures containing up to 30 per cent kerosene, taking them in stride. Illinois gas oil as low as 33° A.P.I. gravity has been cracked without difficulty and with no serious effect on yields.

Operating conditions have been varied as much as charging stocks to meet special requirements. For instance, since isobutane became available from outside sources, the reactor temperature has been progressively increased to 950° F. in order to produce at the same time the maximum amount of butylene for alkylation and a base stock suitable for aviation blending without treatment other than a caustic wash.

During periods when output of 100-octane gasoline is limited by shortage of alkylate, the over-all production has been increased by improving the quality of the base stock in a partial retreating operation in which 400° F. e.p. gasoline from the receiver is returned to the reactor along with the fresh feed.



Fluid catalytic cracking unit. Left to right: storage hoppers, fractionating column, catalyst cracking, and regenerator section. Cottrell precipitator at top right

Side-cut or cycle stock from the fractionator, which usually is cracked in No. 3 unit, has been recycled to the catalytic reactor in order to maintain maximum yields of base stock during periods when the supply of virgin charge stock was insufficient.

For instance, during the first 2 weeks in February, 600-700 bbl. per day of recycle gasoline was charged to the unit, together with 4,000-4,200 bbl. of virgin gas oil in order to improve base stock quality. Late in February, the operation was changed. Instead of recycling raw gasoline, 750-850 bbl. per day of side-cut cycle stock was charged to the unit with 4,300-4,400 bbl. of fresh gas oil, in order to increase the over-all production of aviation gasoline.

When sufficient fresh feed stock again became available, recycling was stopped and the charge of fresh feed was increased to 4,800-5,000 bbl. per day.

In operating this catalytic cracker, fresh oil feed passes through a G-fin

TABLE 1—YIELDS FROM CATALYTIC CRACKING

Debutanized base stock, volume per cent	36.4
Naphtha, volume per cent	7.1
Light gas oil (cycle stock), volume per cent	23.6
Total C_4 fraction, volume per cent	26.4
C_3 and lighter gases, weight per cent	12.8
Coke, weight per cent	5.9

Normal Feed Stock and Quality of Products

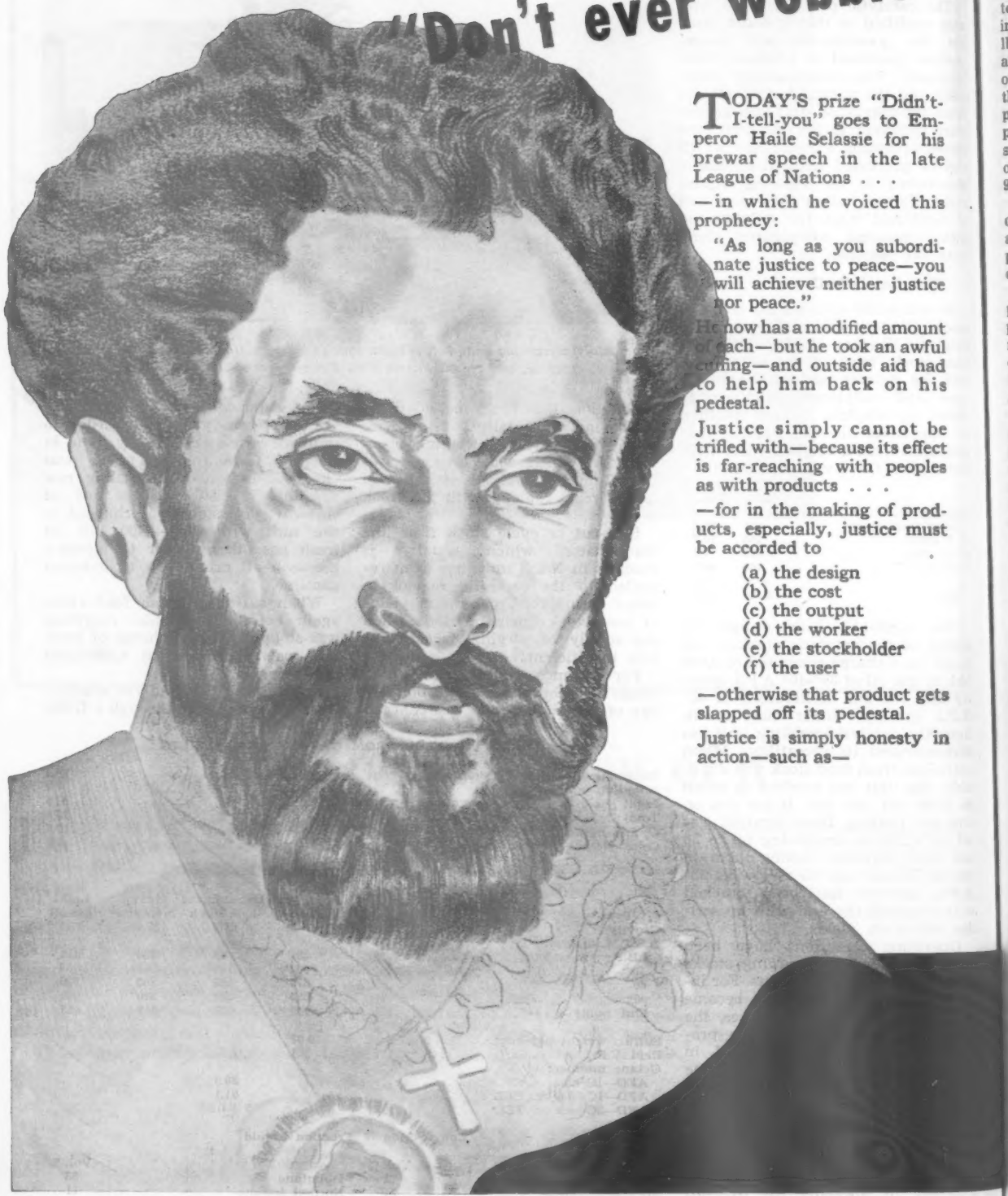
Type—	Fresh feed gas oil	Debutanized base stock	Heavy naphtha	Light gas oil
Gravity	39.0	66.0	37.4	37.5
A.S.T.M. distillation:				
I.B.P., °F.	387	99	338	412
10	492	116	349	485
50	575	155	360	530
90	658	284	370	600
End point	705	327	417	665
Sulfur, weight per cent	0.01	...	...	...
Reid V.P.	9.1	...	...	...
Octane number:				
AFD—1C clear	...	80.8	...	...
AFD—1C+4.6 cc. TEL	...	91.1	...	...
AFD—3C+4.6 cc. TEL	...	5 + 0.37	...	...

Composition C_4 Fraction Liquid

	Vol. %		Vol. %
Isobutylene	12	Isobutane	53
Normal butylene	24	Normal butane	11

then he said to himself

"Don't ever wobble"



TODAY'S prize "Didn't-I-tell-you" goes to Emperor Haile Selassie for his prewar speech in the late League of Nations . . .

—in which he voiced this prophecy:

"As long as you subordinate justice to peace—you will achieve neither justice nor peace."

He now has a modified amount of each—but he took an awful cuffing—and outside aid had to help him back on his pedestal.

Justice simply cannot be trifled with—because its effect is far-reaching with peoples as with products . . .

—for in the making of products, especially, justice must be accorded to

(a) the design
(b) the cost
(c) the output
(d) the worker
(e) the stockholder
(f) the user

—otherwise that product gets slapped off its pedestal.

Justice is simply honesty in action—such as—

heat exchanger in which its temperature is raised to 300° F. by exchange with a portion of the slurry circulating stream from the bottom of the fractionator, and thence to the heater in which the temperature is raised to 750° F.

The partially vaporized charge enters the catalyst section at the line through which catalyst at a temperature of 1,050°-1,100° F. is injected into the reactor. About 1,300 lb. per hour of steam is introduced at the injector, to assist the mixing of catalyst and oil. The catalyst from the regenerator supplies the greater part of the heat required for vaporizing and cracking the charging stock. Current operation is carried out with a reactor temperature of 950° F.

With a regenerator temperature of approximately 1,100° F., the catalyst circulation rate is about 7 tons per minute, which maintains a ratio of 15 lb. of catalyst per pound of oil.

The combined catalyst and oil vapors enter the reactor through a perforated distribution grid located near the bottom of the reactor, and of such size that an annular space is left between the edge of the grid and the walls of the reactor.

The oil-catalyst contact time depends upon the weight of catalyst in the reactor rather than the volume, since the density of the catalyst in the dense phase may vary with other operating conditions. A constant weight of catalyst is maintained in the reactor by a controller actuating the slide valve at the bottom of the regenerated catalyst standpipe to maintain a constant differential across pressure taps at the top and bottom of the reactor.

Most of the catalyst entering the reactor is withdrawn from the dense phase through the annular space around the inlet grid, passing downward into a conical section and thence into the drawoff line or reactor standpipe. About 3,000 lb. per hour of steam is injected at three levels around the conical section in order to strip hydrocarbon vapors from the spent catalyst.

The fractionator is an 11 by 65-ft. tower containing 12 trays above a center well, and 2 trays, 2 perforated plates and 7 perforated disk and donut pans below. Heat is recovered from the lower section by circulation of fractionator bottoms through a steam generating heat exchanger which produces 7,000 lb. per hour at 125 lb. pressure.

Oil leaving the stream generator at 400° F. is returned to the fractionator at the upper perforated tray, along with the bottoms stream from the fresh feed exchanger. This circulation of bottoms not only supplies the necessary cooling, but also provides the liquid wash for scrubbing entrained catalyst from the rising vapors.

The concentration of catalyst in the bottoms or slurry is maintained between 0.5 and 1.0 lb. per gal. by continuously returning column bottoms to the reactor via the injector.

The fractionator operates at a pressure of 5 lb. The bottom temperature is held at 550°-575° F. and the top temperature is maintained at 225° F. by returning gasoline from a reflux accumulator to the top of the column. Water from the condensation of the steam injected into the reactor is withdrawn continuously from a leg on the reflux accumulator.

Overflow from the accumulator passes through a subcooler into a receiver from which the 400° F. e.p. unstabilized gasoline is pumped to the gas-concentration unit, while the gas goes to the compressor suction drum and thence to the first stage of a 600-hp., two-stage, gas-engine-driven Cooper - Bessemer compressor.

Spent catalyst leaves the bottom of the reactor at 900°-950° F., passes through a slide control valve and drops into the line through which air for regeneration is introduced. The catalyst is picked up by this air stream and carried upward into the regenerator through the regenerator riser, inside diameter of which is 36 in.

The combined air and catalyst stream passes through a perforated grid into the main section of the regenerator in which the catalyst settles into a dense phase. The temperature in the regenerator is 1,050°-1,100° F., maintained by burning coke deposit on the catalyst. Coke on the spent catalyst amounts to 1.0 to 1.5 per cent by weight. This is reduced to 0.5 to 1.0 per cent in the regenerator.

The total quantity of coke burned in the regenerator is 30-35 tons per day. Regenerator air is supplied by a turbo-blower unit capable of delivering 11,600 standard cu. ft. at a discharge pressure of 18 lb., with an oxygen concentration of 2-3 per cent in the combustion gases.

Combustion gases from the regenerator pass overhead at 1,000°-1,050° F., through a waste heat boiler in which sufficient heat is recovered to generate 3,000 lb. of 40-lb. steam per hour. The partially cooled gases are further cooled to 375°-400° F. by the injection of water into the duct below the waste heat boiler.

Combustion gases carrying a small quantity of catalyst fines are released at the top of the precipitator. The total inventory of catalyst in the unit is approximately 125 tons, of which 35 tons is above the grid in the reactor and 55 tons above the regenerator grid. The catalyst replacement on this unit amounts to approximately 1 ton per day.

In order to minimize the use of alloy steel the vessels and lines in service over 1,000° F. are internally insulated with 4 in. of soft insulating block and 3 in. of Bigelow-Liptak refractory tile.

The catalyst used presently is a synthetic silica-alumina having an average particle size of about 22 mesh.

The Gas-Concentration Unit

The function of the gas-concentration unit is to separate and dis-

These men represent the four refining companies that joined together in the 100-octane-gasoline project after 15 years of informal but successful operation of a common thermal cracking plant. Top row: W. S. Zehrung, president, The Pennzoil Co.; R. R. Reitz, secretary, Quaker State Oil Refining Corp.; A. W. Scott, president and secretary, Wolf's Head Oil Refining Co., and A. B. Weingard, president, Continental Refining Co. Bottom row: J. C. Grosser, superintendent, Plant No. 2, The Pennzoil Co., and D. W. Grant, vice president, The Pennzoil Co.

These men do not listen for the quitting-time whistle. They work day and night to squeeze out the last drop of 100-octane gasoline the facilities can produce. They have increased output of fighting aviation gasoline 50 per cent above the design capacity of the units. With J. C. Grosser, they are responsible for the operation of Plants 2 and 3. Top row: L. R. Brandon, Jack Stevens, and W. E. Lemen, of Universal Oil Products Co.: Bruce Rooker, Jack Beighley, and Kenneth Smith. Bottom row: Ralph Crowther, Alan Hoffman, Clayton Fintaine, Harry Fennick, Raymond Dardes, and Bob Swoope. Swoope is with U.O.P.

tribute the various hydrocarbon fractions contained in the catalytic gasoline, the compressor condensates, the stabilizer overhead condensate, and the high-pressure gases to the best advantage. This makes it necessary:

1. To recover C_2 and heavier hydrocarbons from the cracking plant gases.

2. To segregate the C_3 fraction for feed to the alkylation or polymerization unit.

3. To segregate the C_4 fraction for alkylation feed.

4. To rerun the 400° F. e.p. catalytically cracked gasoline to 330°-340° F., base stock.

5. To segregate the C_5 fraction for aviation gasoline blending or charging to the alkylation unit.

Catalytically cracked gasoline of 400° F. e.p., high-pressure catalytic and thermal gas, and high-pressure compressor condensate are charged to the deethanizer. This is a 4 by 60-ft. column containing 28 trays and operating as a combination absorber and stripper. Catalytic naphtha is circulated over the top at the rate of 15-20 gal. per minute, as the absorption medium. Ethane and lighter gases are removed overhead and go directly to the fuel gas system. The bottoms, consisting of C_2 and heavier hydrocarbons boiling up to 400° F., are charged to the depropanizer which also receives a low-pressure condensate from the catalytic cracker and stabilizer overhead condensate from the thermal cracker.

The depropanizer is a 6½ by 53-ft. column containing 30 trays and operating at 250 lb. pressure. The propane-propylene overhead fraction may be charged to the polymerization unit, the alkylation unit, or released as a gas to the fuel system. Bottoms consisting of C_4 and heavier fractions boiling up to 400° F., flow to the debutanizer under system pressure.

The debutanizer is a 6 by 69-ft. tower with 28 trays operating at 50-100 lb. pressure. The BB fraction recovered overhead, consisting of isobutane, normal butane, and butylenes, is caustic washed. This fraction is the normal feed to the alkylation unit. The bottoms from this tower, consisting of C_5 and heavier hydrocarbons boiling up to 400° F., flow under system pressure to the rerun column.

The rerun column is 6½ by 38 ft. with 20 trays, operating at 5 lb. pressure. The overhead is 330°-340° F. e.p. debutanized base stock which contains all of the catalytic C_5 fraction.

The bottom stream is 300°-400° F. catalytic naphtha, part of which is pumped over the top of the deethanizer as absorber oil while the remainder goes to storage, later to be blended with the thermally cracked and reformed gasoline. The overhead from the rerun column, after passing through a caustic scrubber, enters the depentanizer.

The depentanizer is a column 5 by 76 ft. with 40 trays operating at 25 lb. pressure. The overhead is C_5 fraction which goes to storage. The bottom stream is depentanized catalytic base stock which represents about a 20 per cent yield on the gas oil-kerosene charge to the cat cracker. The caustic treated base stock is inhibited, blended with alkylate and isopentane, ethylized to make 100-octane gasoline.

The HF alkylation unit is a process which combines isoparaffins with olefins in the presence of a catalyst to produce alkylate, an essential component of 100-octane aviation gasoline. Isobutane is the isoparaffin employed; butylenes are the olefins used although propylene and amylenes are also employed.

The fact that the new facilities today are producing 150 per cent of the originally estimated output of 100-octane gasoline is largely due to modifications made in the operation of the alkylation unit which made possible the utilization of additional C_3 and C_5 fractions as feed stock for alkylation.

ALKYLATION FEED — OLEFINS

	Per cent
Propylene	2.8
Butylenes	73.4
Amylenes	23.8

The process is divided into four main sections, as follows: Feed preparation, contacting, fractionation, and acid regeneration. The olefin-containing feed recovered in the gas-concentration unit is charged through the feed dryers which are three 2 by 14-ft. towers filled with Florite, a commercial desiccant. The feed flows directly from the dryers to two No. 30 Stratco contactors.

The contactors are manifolded for parallel flow of the olefin-containing feed, and for series flow of the isobutane recycle and acid, the effluent from No. 1 contactor passing to No. 2. In recent operations it has been found advantageous to dry all or a part of the isobutane recycle by passing it through the dryers along with the BB feed. Thus a part of the isobutane recycle also passes to the contactors in parallel.

The alkylation unit was designed for 6:1 ratio of isobutane to olefin, based on the total feed to the contactor and the space time was 30 minutes. The throughput has been increased to the point where the yield of alkylate is nearly twice the design production.

The high throughput has reduced the isobutane; olefin ratio to as low as 3-4:1 and the space time to 15-20 minutes, and has resulted in only slight sacrifice in quality of the alkylate.

Intimate mixing of acid and hydrocarbon takes place in the contactors which operate at a pressure of 85 to 125 lb. Since heat is generated in the reaction, the contactor is provided with a Griscom-Russell G-fin tube bundle through which water circulates. The tubes are seamless steel, 1½ in. in diameter. Temperature in the contactors is maintained at 75°-100° F.

From the contactors, the acid-hydrocarbon mixture goes into the acid settler, a horizontal 8 by 30-ft. vessel provided with baffles. The hydrocarbon phase is drawn from the top of the settler into the depropanizer charge drum, a 3 by 30-ft. vessel. Feed to the depropanizer is pumped from this drum through

a preheater in which its temperature is raised to about 180° F.

The depropanizer, a 5 by 40-ft. tower with 35 trays, operates at 300 lb. pressure. The propane overhead stream is pumped to a stripper for separation of propane and acid.

A portion of the propane feed, together with all of the free HF, passes overhead into the depropanizer vapor line. The remainder of the propane passes from the bottom of the stripper through a small drum filled with limestone and thence to the fuel-gas system. Acid recovered in this system collects in a leg on the depropanizer receiver from which it is returned to the settler.

Acid regeneration involves two steps: the removal of any polymer or tar formed in the reaction, and the removal of water. The first step is accomplished in the regenerator, which is a 3 by 30-ft. tower with six side-by-side pans below the feed line and 1 ft. of carbon Raschig rings. The tower operates at 90 lb. pressure and at a temperature of 242° F.

The HF is flashed overhead by introducing stripping isobutane through a superheater operated at 360° F. Polymer or tar is withdrawn from the bottom of the column and sent to the boiler fire boxes. The greater part of the acid overhead is returned to the settler along with the stripping isobutane. A small portion of the acid overhead is charged to the dehydration column, in which the water is removed from the bottom as a constant boiling mixture containing about 40 per cent acid which is neutralized with lime.

The hydrocarbon stream leaving the bottom of the depropanizer contains a small amount of combined fluorides which is removed by passing this stream through bauxite at 200°-240° F. and 290-300 lb. pressure. The bauxite is contained in two towers each 4½ by 25 ft.

The hydrocarbon stream from the bauxite tower flows to the deisobutanizer, a 7 by 110-ft. tower, containing 50 trays and operating at 100 lb. pressure. Overhead vapors from this column are partially condensed and passed into an accumulator from which reflux is returned to the top of the column at a ratio of 2-2.5:1 to maintain a temperature of 120° F. The net overhead passes through a secondary condenser into the final receiver from which the isobutane recycle is returned to the contactors.

Bottoms from the deisobutanizer are charged to the debutanizer which is a 3 by 47-ft. column with 25 trays operating at 80 lb. pressure. Overhead from this column is partially condensed and passed into an accumulator from which reflux is returned at a ratio of 3.5-4:1 to the top of the column to maintain a temperature of 135° F.

The bottoms from the debutanizer flow under system pressure to the rerun column, a 3½ by 42-ft. tower containing 20 trays. The overhead from this column is the finished aviation alkylate fraction having the following characteristics:

QUALITY OF ALKYLATE PRODUCED	
Octane rating A.S.T.M., clear ...	91.1
AFD—1-C + 4.6 cc. TEL	108.0
AFD—3-C + 4.6 cc. TEL .....S + 2.46	
90 per cent point, °F.	238
End point, °F.	294
R.v.p., lb.	6.5

This material goes to intermediate storage and subsequently is blended into aviation gasoline. The bottoms from the rerun column amounting to less than 10 per cent of the total alkylate, are charged to the catalytic-cracking unit for further recovery of material boiling below 330°-340° F. and cracking of fractions boiling above 400° F.

The possibility of installing an isomerization unit in conjunction with the other operations was investigated. However, the production of normal butane in the cracking operations is only sufficient to meet vapor pressure requirements of the motor gasoline and there is not enough casinghead gasoline available to the refinery to make up vapor pressure specification.

Utilities

The utilities provided in connection with the operations in Plant 3 include:

The steam plant, three Union Iron Works boilers designed to produce 50,000 lb. of steam per hour each, at 275 lb. pressure. Powdered-coal-burning equipment was installed by Raymond Pulverizer Division, Combustion Engineering Co. Not only does the boiler plant supply all the steam needed in Plant 3, but also it pipes a considerable quantity to Plant 2.

Another innovation is a six-section induced-draft cooling tower. This, installed by Water Cooling Equipment Co., was designed to cool 10,000 gal. a minute from 110° F. to 85° F. at 75° F. wet bulb. Loss of water through the system is only about 5 per cent.

Other facilities include an inhibiting system, blending tanks furnished with Lightning mixers, an Ethyl plant equipped to handle Ethyl fluid in tank-car lots, safety building with first-aid room, time and change house, shop and complete laboratory for testing products.

Storage for 100-octane gasoline and its components includes:

One 5,000-bbl. 85-lb. pressure Hortonsphere for alkylate feed stocks.

Two 1,000-bbl. 8-lb. pressure vertical bullets for isobutane.

One 1,000-bbl. 85-lb. pressure vertical bullet for normal butane.

Two 2,500-bbl. 25-lb. pressure spheroids for catalytic pentane.

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WELL WATER SYSTEMS
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ELECTRONICS —Its Application to Petroleum Technology

by Fabian R. Staley

"The successful application of electronics in field instruments has overcome the natural distrust of things that are new and untried. At the present time, electronics is applied successfully to instruments used in all the geophysical exploration methods, such as seismic, thermal, magnetic, electrical, and gravitational."

Keith Henney

PART III

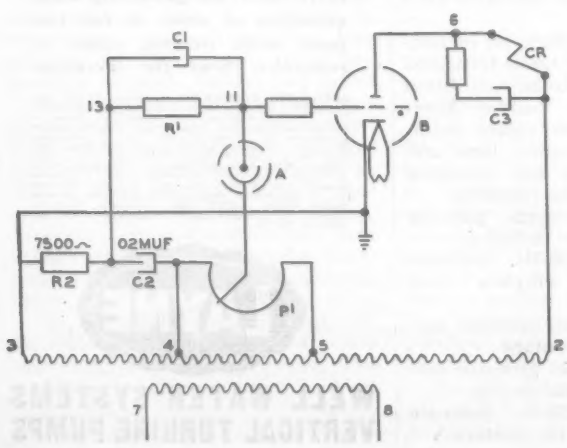
ELECTRONICS is a scientific tool. The engineer employing it should be thoroughly familiar with the principles that govern the internal behavior of electronic devices, and also he should know the methods of circuit analysis commonly used for their industrial application. There are numerous kinds of industrial circuits, many of which are patented. On analysis, however, many of them are found to be variations of basic circuits or combinations of these. Circuit diagrams are generally supplied with electronic equipment by the manufacturer. Unless the circuit is very simple, the first step should be to revise the diagram to the elementary form for analysis.

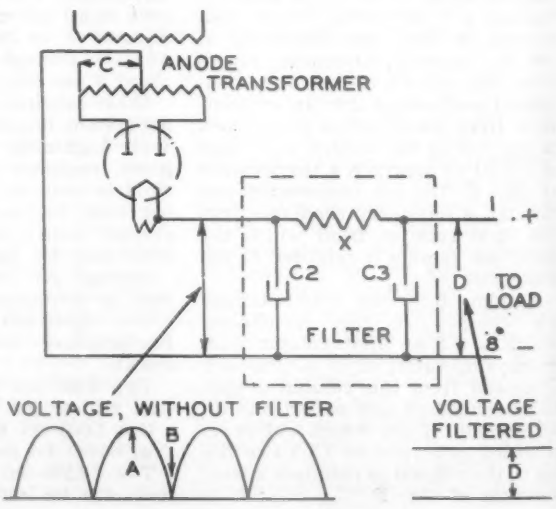
The elementary diagram should show the sequence from the most negative potential progressively to the most positive potential. It should show layout including incoming power leads, switches, fuses, cathode heating, and timer. Any magnetic control devices should be shown also. The sequence of circuits should be drawn beginning with the input signal, and adding each circuit in turn as the control signal is amplified or converted. All of the components should be marked with their correct values if known. The operation of the circuit then can be traced from beginning to end, or in reverse. If the circuit uses alternating-current power, it can be assumed that the cathode of the first tube is negative. For the determination of the thyratron-grid phase shift it might be necessary to use vectors. As a final resort, it might be well to draw a point-to-point curve of the voltages and currents through a complete alternating current cycle. A few typical industrial electronic circuits will be described.

Photoelectric Circuits

A circuit of an alternating current photoelectric relay is shown in Fig. 1. This circuit includes a potentiometer P1 which may be adjusted so that the relay will operate at the desired light intensity of the phototube. When P1 is turned toward 4, the phototube A and R1 are connected across a smaller portion of the transformer supply voltage, and a greater amount of light must reach the phototube in order to operate the relay. Capacitor C3 is charged during the half cycle when tube B passes current, and C3 then discharges through the coil of CR, during the following half cycle. There must be sufficient light on the phototube during the 30-second warming period to prevent thyratron B from passing current. Otherwise thyratron B tries to pass anode current before the cathode is hot enough to furnish necessary electron flow. A gaseous phototube can pass more current than the vacuum type, and is generally used in industrial applications. This general-purpose relay does not respond to a light change of less than 1/5-second duration. It is generally used as an off-on device. The relay is in deenergized position as long as a beam of light (40 or more foot-candle intensity) is falling on the photoelectric tube, but if some object should decrease the

Fig. 1—(Below) Circuit of a commercial a.c. photoelectric relay
Fig. 2—(Right) An electronic rectifier and filter





intensity the relay will pick up and close some auxiliary circuit.

Interlocked magnetic and phototube controls are used to advantage in many operations. An important application is for the control of grinding and cutting tools in following templates or contours of any shape to a high degree of accuracy. Some applications require high-speed photoelectric relays which must be operated by light impulses lasting only .001 second. Night aerial cameras are operated by phototubes that initiate a voltage in an electronic amplifier causing a magnetic shutter to trip at the peak light intensity of a flash bomb lasting a few thousandths of a second.

This high-speed operation cannot be obtained by supplying an alternating current directly to the tubes and the solenoids of the electronic circuit, since the light beam might interrupt at a point on the voltage curve where the voltage is too low, and the cutoff operation would be delayed beyond the accuracy required. If alternating current is supplied part of it must be converted into direct current for internal use. This type circuit is shown in Fig. 2—a full-wave rectifier tube 1 and its anode transformer convert alternating current into a pulsating direct-current voltage. This pulsating direct-current voltage must be filtered to produce a steady voltage available at any instant. This is accomplished by means of capacitors C2 and C3 together with reactor X. The capacitors become charged during intervals of maximum voltages A, and the

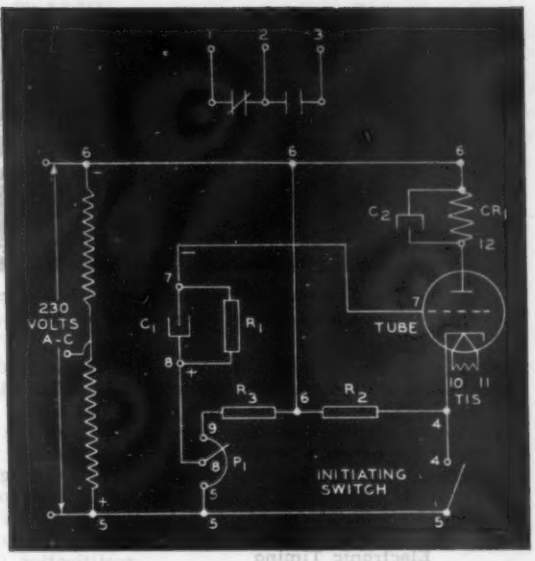


Fig. 3—Elementary diagram of electronic timer

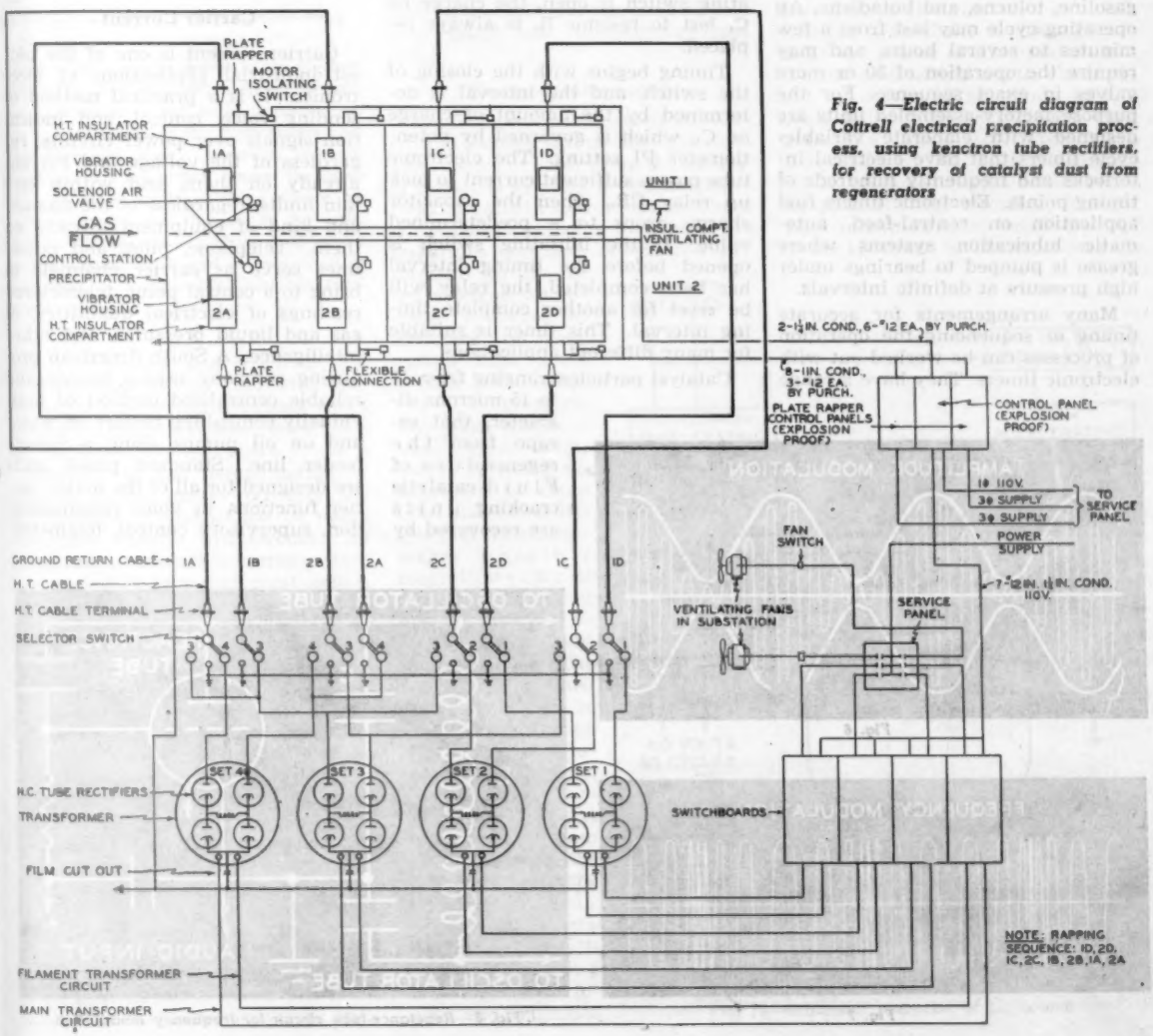


Fig. 4—Electric circuit diagram of Cottrell electrical precipitation process, using kenotron tube rectifiers, for recovery of catalyst dust from regenerators

Fig. 5—Simplified diagram showing how a carrier-current circuit is established in one phase of a three-phase circuit

energy thus stored furnishes voltage to the load during the valley B. At the same time, the flow of load current stores energy in reactor X, which maintains a steadier flow of current, and furnishes a direct current supply for the operation of a high-speed photoelectric relay.

Electronic Timing

Automatic time-cycle valve control is generally used in modern cracking plants producing aviation gasoline, toluene, and butadiene. An operating cycle may last from a few minutes to several hours, and may require the operation of 50 or more valves in exact sequence. For the purpose factory-assembled units are designed with elaborate variable-cycle timers that have electrical interlocks and frequently hundreds of timing points. Electronic timers find application on central-feed, automatic lubrication systems where grease is pumped to bearings under high pressure at definite intervals.

Many arrangements for accurate timing or sequencing the operation of processes can be worked out with electronic timers. They have a range of stepless adjustments. The operation of the timing relay can be followed in Fig. 3—it depends upon the ability of the capacitor to store electric energy, which is slowly dissipated through a shunting resistor until it drops to a predetermined value. When the initiating switch is open, capacitor C_1 is charged by grid rectification (since grid 7 is positive with respect to cathode 4 every other half cycle). This charge is drained off by resistor R_1. While the initiating switch is open, the charge on C_1 lost to resistor R_1 is always replaced.

Timing begins with the closing of the switch, and the interval is determined by the amount of charge on C_1, which is governed by potentiometer P1 setting. The electronic tube passes sufficient current to pick up relay CR_1, when the capacitor charge drops to a predetermined value. If the initiating switch is opened before the timing interval has been completed, the relay will be reset for another complete timing interval. This timer is suitable for many different applications.

Catalyst particles, ranging from 10 to 15 microns diameter, that escape from the regenerators of Fluid catalytic cracking units are recovered by Cottrell precipitators. Kenotron, high-vacuum tubes, are used for current rectification since it is a high-voltage, low-current application. About 75,000 volts are required. The electric diagram for such an installation is shown in Fig. 4.

Principles underlying the attraction and control of small particles by electrostatic precipitation have been known for 2,500 years, and these laws are now applied to industrial problems by means of electronic equipment. Electrostatic precipitation is used to remove fly ash from boiler plants and dust from air in plants and laboratories, for the recovery of valuable material as synthetic catalyst dust, and for material deposition as in the manufacture of sand paper and the electrocoating of fabrics.

Power equipment for electrical precipitation usually consists of step-up transformers, high-tension electronic rectifier tubes, control and protective apparatus, and special auxiliary equipment, as automatic current-regulation equipment.

Carrier Current

Carrier current is one of the oldest industrial applications of electronics. It is a practical method of sending voice, control, and indication signals over power circuits, regardless of the voltage and current already on them, and within certain limits, regardless of the amount and kind of equipment already on them. Telephone, pilot, and power lines serve as carrier channels to bring to a central point, telemetered readings of electrical quantities, of gas and liquid pressures, and other intelligence. A South American producing company uses a simple and reliable centralized method of individually controlling motors on water and on oil pumps along a remote feeder line. Standard panel units are designed for all of the major carrier functions, as voice communication, supervisory control, telemeter-

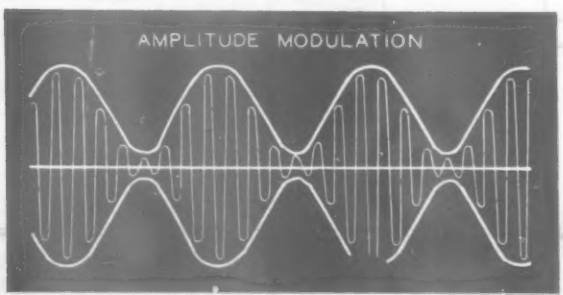


Fig. 6

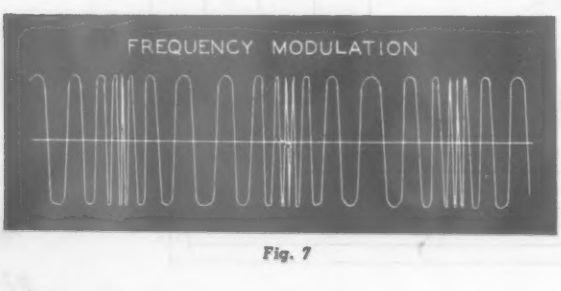


Fig. 7

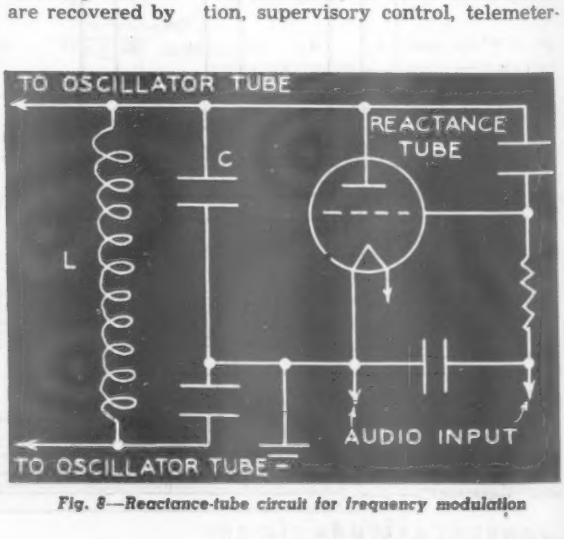


Fig. 8—Reactance-tube circuit for frequency modulation

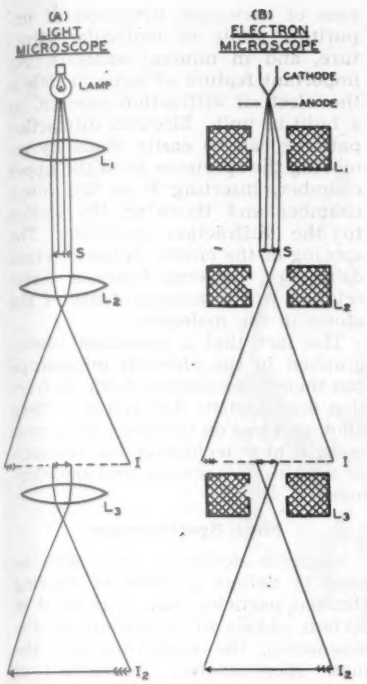


Fig. 9—The magnetic lenses in the electron microscope are arranged in the same manner and perform the same functions as the optical lenses in the light microscope. The magnetic lenses, however, are not moved as are the optical lenses; the same effect is more easily obtained simply by varying the current flowing in the coils. This varies the intensity of the field acting on the electron rays and is equivalent to producing a continuously variable focal length lens

ing, load control, and relaying. All of these applications deal with carrier currents transmitted along wires at frequencies lower than those used for radiation through space.

Modulation and demodulation of carrier waves makes possible the simultaneous transmission of many messages without interference. By amplitude modulation carrier waves are varied in terms of crest amplitude, and kept constant in terms of crest time intervals. The carrier frequency remains constant because it is determined by the values of inductance and capacitance in the resonant circuit. By frequency modulation carrier waves are varied in terms of time intervals between crests, and kept constant in terms of amplitude. In any electronic oscillator, the frequency of oscillation can be changed if the inductance or capacitance in the resonant circuit is varied. The capacitance in the circuit can be varied by means of a reactance tube, in which the equivalent plate-to-cathode capacitance can be changed by varying grid bias. If its grid circuit is connected to an audio signal this capacity will vary with the impressed signal, and the result will be a frequency modulated carrier wave. This kind of wave is superior to one modulated by amplitude in its ability to transmit signals with much less interference from static.

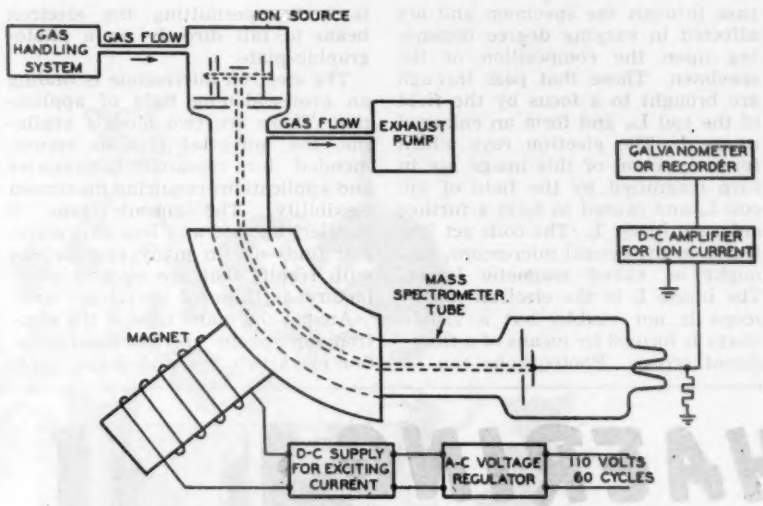


Fig. 10—Schematic operation of mass spectrometer tube

Electron Microscope

Electrons can be reflected, refracted, and focused just as can light rays. The science of controlling the motion of electrons by electric and magnetic fields is called electron optics. There is a correspondence between the quantities and laws of electron and physical optics. In the electron microscope a beam of electrons is used, and a light beam is used in the optical microscope. The wave length of light used limits useful optical magnification to about 1,000 diameters. The electron microscope makes possible magnifications as much as 50 times greater than can be obtained with light microscopes. The similarity is illustrated in Fig. 9; in the light microscope the source of illumination is a lamp, the light rays from which are brought into a parallel beam and directed on the specimen S by the condenser lens L_1. The image of the specimen then falls on the objective lens L_2, which focuses and magnifies it, producing an enlarged image I. Part of this enlarged image is further magnified by the projector lens L_3. The twice enlarged image I_2 is then seen by the eye.

In the case of the electron microscope the source of illumination is a hot cathode which emits electrons, and by means of an anode with a small hole in the center the electrons are made to move at a high velocity. A doughnut-shaped coil L_1 produces a field which bends the path of these electrons, forming them into a parallel beam directed on the specimen S. The electron rays

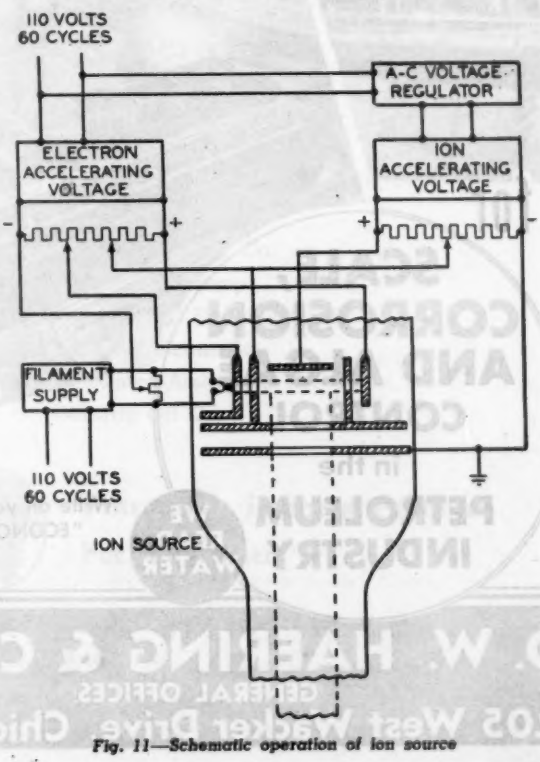


Fig. 11—Schematic operation of ion source

pass through the specimen and are affected in varying degree depending upon the composition of the specimen. Those that pass through are brought to a focus by the field of the coil L_3, and form an enlarged image I. The electron rays which form a section of this image are in turn magnified by the field of the coil L_2 and caused to form a further enlarged image I_2. The coils act like lenses in the optical microscope, and might be called magnetic lenses. The image I_2 in the electron microscope is not visible, but a visible image is formed by means of a fluorescent screen. Photographs can be made by permitting the electron beam to fall directly on a photographic plate.

The electron microscope is finding an ever-widening field of application. There are two models available, the universal type is recommended for research laboratories and applications requiring maximum flexibility. The console type is smaller, lighter, and less expensive, and finds use in many applications with results that are equally satisfactory as those of the larger unit.

Among the many uses of the electron microscope are the determination of particle size and shape, analyses of materials, detection of impurities, study of molecular structure, and in mineral analysis. An important feature of some models is the electron diffraction camera, as a built-in unit. Electron diffraction patterns can be easily made by removing the specimen from the upper chamber, inserting it in the lower chamber and throwing the switch to the diffraction position. The spacing of the circles in the electron diffraction patterns bears a direct relation to the arrangements of the atoms in the molecule.

The fact that a specimen photographed in the electron microscope can then be examined in the diffraction unit, and its diffraction pattern photographed on the same slide, presents a new technique for research as well as for control and development.

Mass Spectrometer

Magnetic deflection may also be used to deflect a beam of moving charged particles, and it is used in certain phases of television, in the magnetron, the cyclotron, and the mass spectrometer. A method of focusing a beam of ions having widely different velocities was suggested by Dempster, and depends upon the fact that particles bent in a semicircle will be focused at the end of their path and thus can be detected with accuracy. This focusing action is frequently used in nuclear physics. The mass spectrometer permits rapid qualitative and quantitative gas analysis. It finds application in the manufacture of aviation gasoline, synthetic rubber, explosives, and chemicals. In addition to routine analysis, it is used for small samples of gas (only a few cubic centimeters), in tracer work where stable isotopes are used, and for detection of small traces of gas in a mixture.

The operation of the mass spectrometer is comparatively simple. The gas molecules are ionized in a quadrant-shaped vacuum tube, shot into a magnetic field, and deflected onto a metal target. This target collects the electric charges on the ions and causes a minute current, which is amplified by a vacuum tube, and its value is read on a galvanometer or recorder. Differences in the amount of deflection of different masses by the magnet provides a means for qualitive measurement of the sample. The magnitude of the current collected on the target is the quantitative measurement of the gas components. Accurate control of the speed of the ion stream and strength of magnetic field permits the ion streams of different gases to be focused successively on the target. If the magnetic field strength is varied from maximum to minimum, it is possible to aim the heavy,

(Continued on page 141)

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Alignment Chart for Calculating Volume of Gas Lost When Purging Line Through Standard Size Blowoff

Formula: $V = CT\sqrt{P^2 - \left(\frac{C^2 P^2}{C^2 + K^2}\right)}$

When:

V = volume in M.c.f. (8 oz. 14.4 psi.) discharged from line section through blow-off during purge

C = one hour Weymouth pipe-line coefficient for section $\left(\frac{35.68\, d^{8/3}}{\sqrt{L}}\right)$

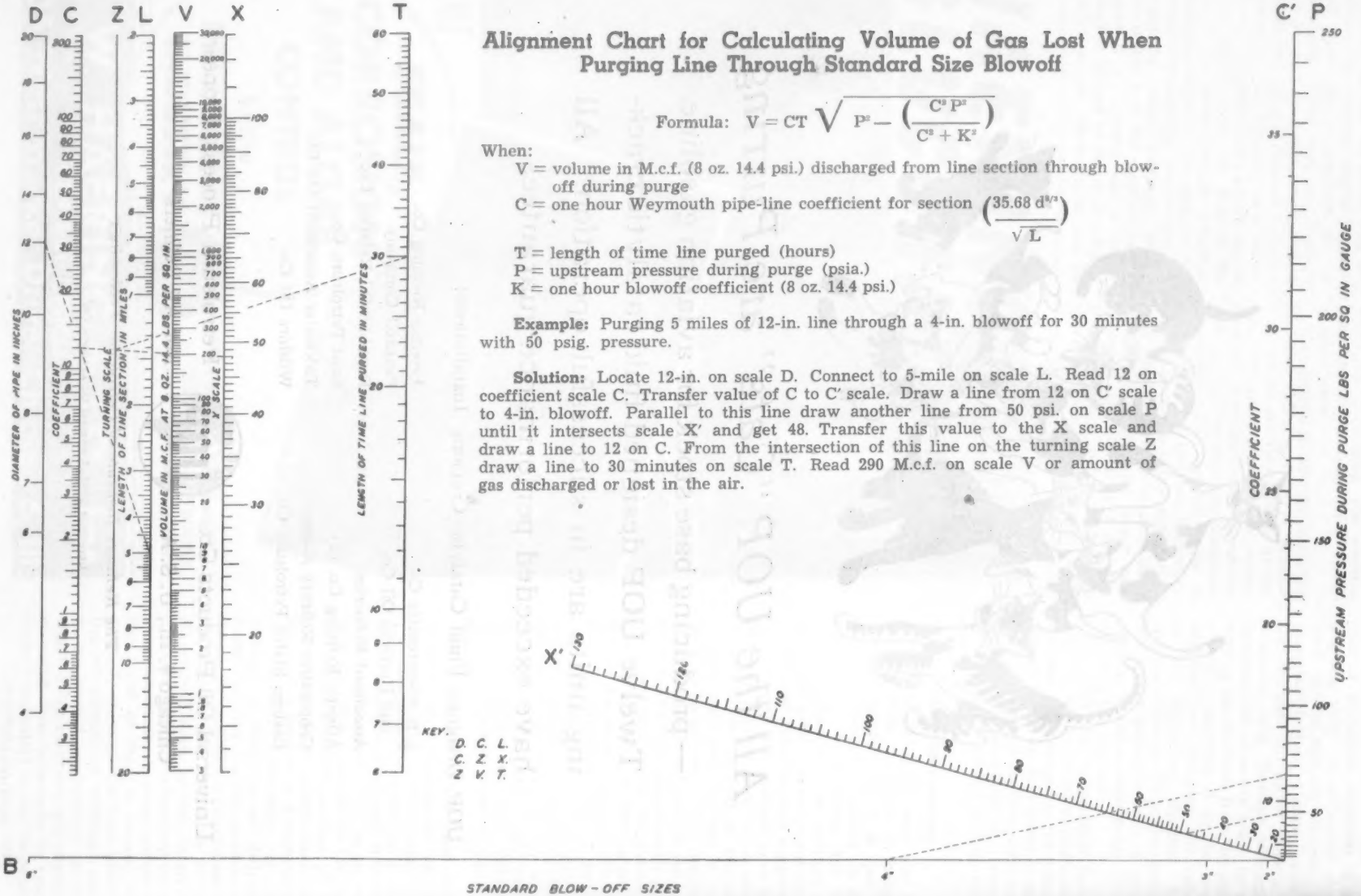
T = length of time line purged (hours)

P = upstream pressure during purge (psia.)

K = one hour blowoff coefficient (8 oz. 14.4 psi.)

Example: Purging 5 miles of 12-in. line through a 4-in. blowoff for 30 minutes with 50 psig. pressure.

Solution: Locate 12-in. on scale D. Connect to 5-mile on scale L. Read 12 on coefficient scale C. Transfer value of C to C′ scale. Draw a line from 12 on C′ scale to 4-in. blowoff. Parallel to this line draw another line from 50 psi. on scale P until it intersects scale X′ and get 48. Transfer this value to the X scale and draw a line to 12 on C. From the intersection of this line on the turning scale Z draw a line to 30 minutes on scale T. Read 290 M.c.f. on scale V or amount of gas discharged or lost in the air.



Alignment Chart for Natural Gas Pipe Line Operations

This is the fifth and final of a group of alignment charts prepared by W. D. Parkes, United Gas Pipe Line Co., for the solution of field problems in natural-gas pipe-line operations. The purposes, advantages, and procedure of these charts were explained in an article which appeared with the first chart in the issue of March 17, 1945. Other charts have appeared in the issues of March 24, April 28, and June 9.

THIS chart is used frequently to determine the time necessary to drain a section of line through a standard-size blowoff.

Problem 1: Purging 2 miles of 14-in. line through 3-in. blowoff for 20 minutes with 250 psig. pressure.

Solution: Locate 14 on scale D. Connect to 2 miles on scale L. Read 26 on coefficient scale C. Transfer value of C to C′ scale. Draw a line from 26 on C′ scale to 3-in. blowoff. Parallel to this line draw another line from 250 psi. on scale P until it intersects scale X′ and get 59.5. Transfer this value to the X scale and draw a line to 26 on C. From the intersection of this line on the turning scale Z draw a line to 20 minutes on scale T. Read 510 M.c.f. on scale V, gas lost in purging.

Problem 2: It is necessary to drain 10 miles of 18-in. main line through a 4-in. blowoff. The pressure on the line when it was closed in was 200 psig. How long will it take to drain the line? Note, since the pressure will decline from 200 psig. to 0 it is assumed that the mean pressure is the average pressure, i.e.:

$$\frac{200 - 0}{2} = 100 \text{ psig.}$$

Solution: First determine the storage capacity of the section from chart No. 5-C, it is 1,150 M.c.f. The value of the coefficient is obtained by drawing a line from 18 on D to 10 on L. Read 23 on C and transfer to C′. Draw a line from 23 on C′ to 4-in. on B. Parallel to this line draw a line beginning at 100 psig. on P until it crosses X′ and read 58. Locate 58 on X and connect it to 23 on C. From the intersection of this line on Z draw a line through 1,150 M.c.f. on V and extend it until it crosses T. Read 51 minutes on T, time required to drain the 10-mile section.

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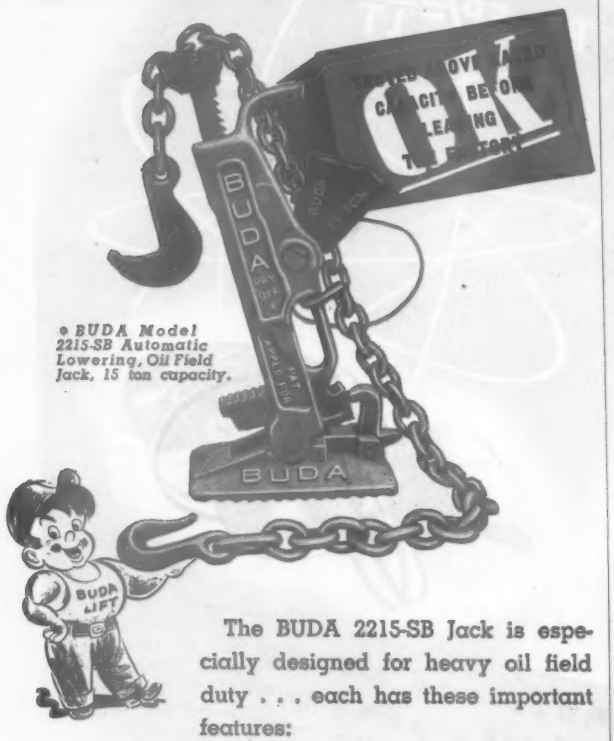

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PROGRESS IN METALS

by W. L. Nelson
Consulting Engineer

Self-Cleaning Tubes

MOST refiners are familiar with the bent-tube sections that are used in condenser boxes in refineries. These consist of a bank of slightly bowed tubes fastened into a header that is common to all of them. Upon changes of temperature the tubes flex a little with the result that scale is, to some extent, dislodged.

The principle has been applied to heat exchanger tubes by Heat Transfer Products, Inc., with the cooperation of International Nickel Co. This development was described in Volume XIX, No. 3 of Inco magazine. The heater of an evaporator for distilling sea water was equipped with admiralty metal tubes having a strip of monel metal attached to the side as indicated in Fig. 1.

The new type of bimetal tube for heat exchangers descales itself by the simple expedient of using the thermostat principle. It is particularly useful for marine and other applications which involve exposure to salt water or hard water. The coefficient of expansion of each metal or alloy is different and hence many combinations of metals may be employed, and application can thus be made to many types of chemical or processing operations.

Unlike the conventional condenser or cooling tube, the new tubes are somewhat oval except at the ends which must be round in order to roll the tubes into the header plates. Along the entire length of the tube is welded or silverbrazed a strip of metal of different coefficient of expansion from that of the tube material. If the tube metal is the material of high coefficient of expansion, an increase in temperature tends to bow the tube and cooling allows it to straighten because of the relatively large contraction of the tube material compared with the contraction of the strip or rib.

It is this bowing and straightening action which cracks off any brittle scale formed on the tube. The action is indicated by Fig. 1. Normal variations in the operating temperature cause some scale to be continuously cracked off of the surface of the tube, but a more complete cleaning can be accomplished by turning off the steam and filling the shell with cold sea water. The tubes are "shocked" a few times by turning the steam on and off. This sudden cooling and heating reverses the alternate contraction and expansion of the tubes, breaking off the scale so that it can be flushed or pulled out through a cleanout door near the bottom of the evaporator. Fig. 2 shows pieces of scale that have been cracked off and broken off the tubes.

With respect to the tubes used in the sea-water still, "monel provides resistance to brine, 32 per cent lower thermal expansion than admiralty, ease of silver-brazing strength and resilience to withstand repeated flexures, good heat transfer properties (important since the strip occupies 20 per cent of tube's area) and galvanic compatibility with brass."

Other combinations of materials are required for services that involve exposure to various corrosive liquids, but the same type of self-descaling tube can be produced by using, for example, Inconel tubes with 18-8 stainless steel strips. Obviously, there are many combinations of corrosion-resistant alloys that provide the necessary difference in coefficient of expansion and freedom from galvanic corrosive action.

Pressure Welding

A. R. Lytle, of Linde Air Products Co., in "Oxyacetylene Pressure Welding," appearing in the December 1944 issue of The Welding Journal, describes the technical and mechanical aspects of this relatively new method of welding. It is a semiautomatic process of welding metals at subfusion temperatures under controlled conditions of temperature and pressure. Square, clean surfaces are butted together under moderate pressure and the weld zone is heated to a uniform temperature of about 1,200° to 1,250° C. until upsetting at the joint occurs. Steels of practically all classes, including the stainless steels, and a number of nonferrous metals and alloys, have been welded successfully. The process is being widely used for welding railroad rails, overland pipe lines from 2 to 24 in. in diameter, oil-well tool joints, small liquefied gas tanks, boiler tubes, and many commercial applications.

Metallurgical Terms

Lute

Lute is the fire-clay mixture used to seal cracks and make a gas-tight joint on annealing box covers, crucible covers, etc.

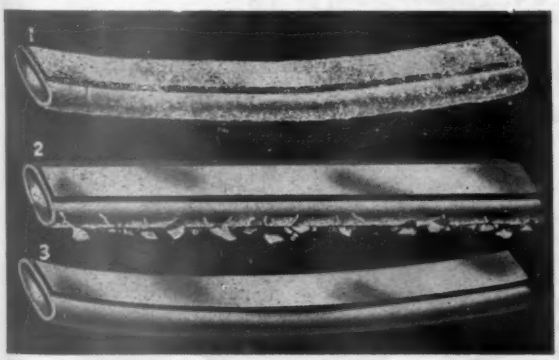

Fig. 1—(Left) Top view shows a section of tube in need of descaling. Middle view shows same section in its original straight position after tube has been cooled by shutting off stream flow. Contradiction to this position flexes the tube and flakes off the scale. Bottom view shows tube, now thoroughly clean, again in service and bowed as far out of line as its bimetal strip will permit. (Courtesy International Nickel Co.) Fig. 2—(Right) This view shows the salt deposit which is cracked off the heating tube in distilling units which convert sea water into fresh water aboard ships. The heavy scale was produced from the bimetal admiralty tube with Monel strip especially developed by Heat Transfer Products

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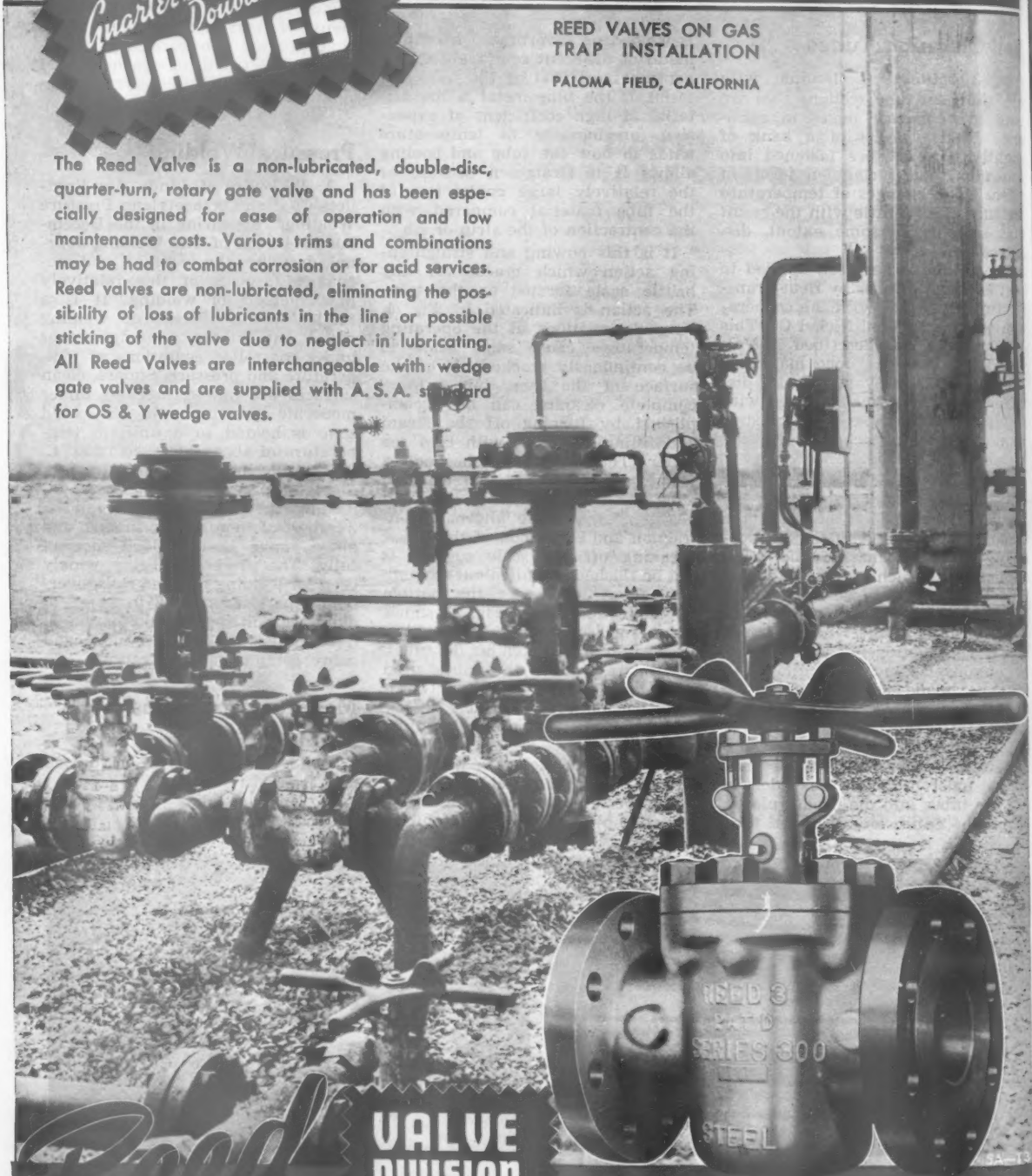

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DRILLING-MUD PROBLEMS—With Suggested Solutions for Several Types

by R. E. Dansby

This is the second of three articles by the author, who is head of the Dansby Mud Engineering Service, Houston. In the first article, published last week, the author described the development of a definite program for drilling and mud control. This article begins a discussion of specific drilling-mud problems, and their solutions, with particular emphasis on mud treating.

DRILLING-mud problems are more or less similar for a given area and depth although they vary greatly in different sections of the world. Research and extensive field work have simplified many of the numerous mud-treating problems, but as drilling is carried deeper and into new territory, new complexities are being encountered. It is the purpose of this article to group various mud problems and to suggest solutions. Although this article primarily discusses mud treating, it should be kept in mind that this phase of the subject cannot be divorced from drilling, and that it is only one of many drilling worries.

Each member of a drilling crew must perform his duty to prevent neutralizing the work done on each phase of the operation but more especially that done on mud. The mud is given credit for many drilling failures that are actually caused by some slip in drilling technique. If the true cause of the trouble is not recognized the same mistake may be made in future operations. Continuous study and systematic educational programs for all drilling personnel are necessary for efficient drilling.

Experience has made it possible to recognize certain changes in mud properties which are indicative of a particular trouble. These changes may be detected in most cases by field mud tests, and correct interpretations of these tests should indicate in advance the treatment necessary to prevent grief. Emphasis is placed on changes in mud properties rather than absolute values; consequently cognizance of these changes requires frequent testing.

It is important to remember that mud and drilling problems experienced in 4,000 to 5,000-ft. holes often have very little in common with those experienced in 1,000-ft. holes. This is to be expected because of extreme changes in pressure, temperature, circulating velocities, and so on. This great difference is often clearly illustrated, for example, when drilling stops, due to drill-pipe failure at a shallow depth, after drilling has gone on for some time at lower depths, circulating time is sharply reduced. It is not unusual for the time for a complete circulation to be reduced from 2 to 3 hours to 30 minutes. When this happens it will be noted that characteristics of the mud, for example the viscosity, can be reduced with very little treatment, and in a short time, sometimes reducing the time from 8 hours to 30 minutes, and the amount of chemicals needed from several hundred pounds to 8 or 10 lb.

Mud for Surface Drilling

In preparing a mud for surface drilling, it is important to have a mud with good properties if a good surface-casing cement job is to be obtained. The surface cement job is important for several reasons but especially because all of the blowout preventing equipment will have to depend upon the surface pipe if the well tries to blow out. To provide a good surface-drilling mud it is first necessary to obtain an abundant supply of pure water, and second it is necessary to use a good bentonite-type clay which will provide the lowest possible density and a good wall-building mud. It is very important to hydrate the clay as much as possible. If steam is available more complete and quicker hydration can be effected by stirring and heating the clay suspension with live steam but care must be taken not to get the mud too hot if rubber pistons are being used in the mud pumps. Increased temperature apparently disperses clay more completely than can be done in cold water. It should be remembered that in drilling surface formation the mud will not be subjected to the agitation and temperatures that it is in deeper drilling, which assists in dispersing the clay. Nine-pound-per-gallon mud is generally acceptable, but the density should never exceed 9.5 lb. per gal., unless surface formations have been charged by previous blowouts. Since surface formations frequently consist of fresh-water sands, a mud having a density of only 10 lb. per gal. is often sufficient to produce lost circulation.

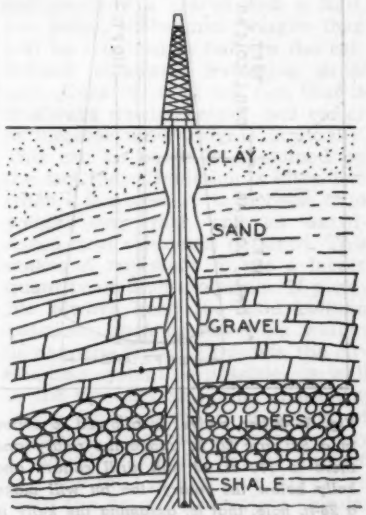

Fig. 1—Cement calculated to come to surface but due to enlarged hole it comes halfway up, leaving surface pipe unsupported

If surface-drilling muds are not properly desanded, the weight is often as high as 12 lb. per gal. which usually results in the loss of mud to the formation. Although desanding is frequently accomplished by settling pits and in some cases assisted by chemical treatment, mechanical desanders have proved in many cases to be more economical and efficient.

The use of a flocculating agent such as a lime or cement should never be considered since these chemicals destroy the wall-building properties of the clay. They may give an apparent increase in viscosity for a short period of time but they are deleterious in the long run.

Mud that will not properly seal the surface sand will permit washing large cavities, as shown in Fig. 1, which will prevent a good cementing job on the surface pipe; however, drilling methods such as bracing the kelly in the cellar until 300 or 400 ft. of hole is made will also assist in preventing cavities. Fig. 2 shows very clearly the size of a hole that may be drilled when the block starts

to wobble. When drilling surface holes without bracing the kelly in the cellar, an arc of 5 ft. made by the swivel will cause the bit to drill a 26-ft. hole, which of course must be filled with cement when cementing surface casing. This condition is very often responsible for a cellar caving in and sometimes the loss of a derrick.

Mud From Surface Pipe to Producing Section

The normal drilling-mud characteristics to maintain in this section are low weight, low viscosity and a reasonably low water loss. These characteristics are usually maintained by treating heavily with fresh water. However, in some cases it is advisable to add some bentonitic clay which should be hydrated before it is added and on occasion it is also necessary to add a small amount of a dispersing agent such as sodium acid pyrophosphate (SAPP). Either or both of these treatments will usually reduce the water loss and improve the wall-building qualities of the mud. A minimum treatment with chemicals should be observed in order that the chemical be more effective when the mud weight is increased.

Practically any of the viscosity-reducing chemicals used successfully in the field will perform to reduce viscosity in this section of the hole but only a few of these will reduce the water loss. It is advisable generally to use the chemical which will be employed later while drilling the producing formations. Many mud-treating chemicals will counteract one another's effect to a certain extent and where it is possible to use only one chemical much better results are obtained.

Lost Circulation

There are a number of types of lost circulation, sometimes referred to as lost returns, and probably many causes. In many instances of lost circulation remedies are relatively simple but in some areas the problem is still very serious and often has not been economically solved.

We are attempting to classify lost circulation into two general groups, first, incompetent formations which break down from excessive hydrostatic pressure or a combination of circulating pressure and mud pressure, and second, cap rock, limestone and other hard formations where large pores, crevices, fractures, and sometimes caverns are encountered.

The first step in combating lost circulation is to analyze the problem and to determine if possible the cause of the trouble. To do this it is necessary to check circulating pressure, whether the bit is balled up, whether there is too much mud, hydrostatic pressure, and other factors. Often the trouble may be caused by an unbalanced mud column or a balled-up bit, or cuttings collecting and bridging in the hole which results in putting the pump pressure on the formation. The following steps are recommended in cases of a slight loss of mud to the formation, which of course can be observed either by the return at the flow line or by the level of the mud in the pit.

1. Reduce the pump pressure.
2. Add a bentonitic-type clay to the mud.

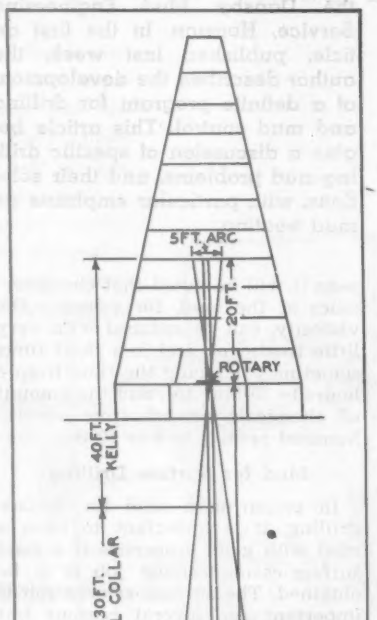

Fig. 2—When swivel is allowed to swing in a 5-ft. arc 20 ft. above the rotary and there is 110 ft. of stiff drill collars and kelly below the rotary, the bit will make a 26-ft. hole, that is, assuming the kelly is braced only at the rotary. There is often enough play in the drive bushings in the rotary to permit this. The kelly should have a second bracing point in the cellar

3. Reduce the viscosity.
4. Reduce the density of the mud
5. If the above steps have not relieved the trouble add a so-called fibrous material to the mud. Strips of a cellophane-type material such as "Jelflake" have proved to be economical and successful in many cases.

If the above measures have not stopped the loss consider cementing.

A number of cementing methods have been used successfully from time to time but in many cases a number of jobs have been required. One explanation for this is that the large pores or fractures take the cement and after this cement is set, additional pressure will open up smaller ones, etc., although it is possible that there is shrinkage when the cement sets leaving openings through which additional cement may be pumped. It is often advisable to add bentonite to the cement, and in many cases lost-circulation materials have proved to assist in cementing the larger crevice-type formations. If bentonites are used the clay should be hydrated by heating and vigorous agitation before it is mixed with the cement. It is futile to attempt to fill most cavities, hence sealing the entrance is the most practical method of stopping the loss of the mud to the formation.

In some cases a gypsum cement which sets quickly through chemical action has been successful but since this cement is influenced by electrolytes and is affected by temperature it is not recommended for deep wells. It sets very quickly when it starts therefore care must be taken to get the drill pipe out of the cement in advance of the setting time.

There have been cases where drilling was carried on successfully without circulation by pumping mud or water into both the drill pipe and the annulus. This process is not recommended as a good drilling practice but it may be successful in certain areas where the cavities or crevices are sufficiently large to take the bit cuttings.

Mud for Drilling Producing Sections

The drilling-mud characteristics should be more closely supervised in this section of the hole than any other because most mud problems are experienced here, therefore each of these problems will be taken up separately after a general discussion is made.

In drilling the producing sections of the hole it is usually advisable to maintain a low viscosity, a low water loss and a density which will overcome any expected formation pressures. To maintain these properties the following steps are recommended:

1. Regulate the addition of water to the mud to obtain desired mud

weight in normal-pressure areas.

2. Add SAPP to lower viscosity and water loss. (Alternate treatment: High pH caustic tannate muds sometimes called "red mud").

3. Add weighting material only when more than 10.2 to 10.5-lb.-per-gal. mud is required; for precaution in wildcatting, when abnormal pressures are expected, or when shale is giving trouble. Raise mud weight before abnormal pressure sections are encountered; if physically possible to predict, at least 1 lb. per gal. more than is calculated to be necessary to balance the abnormal pressure.

4. Add no other chemicals unless treating for salt, cement, or anhydrite.

5. Add hydrated bentonite only when heavy SAPP treatment fails to produce water loss desired.

Study of subsurface data should indicate where producing sections are expected. Mud programs should specify carefully controlled mud characteristics to begin at least 500 ft. above this section. This means that the mud weight should be permitted to increase gradually to the point considered necessary to give a safe differential pressure. This is done by decreasing the amount of water being added to the mud, and using sodium acid pyrophosphate to maintain the desired viscosity.

Dissolve 8 to 10 lb. of SAPP in 50 gal. of water. Add to the mud very slowly at first. (A stream no larger than a match.) After the mud has been treated for several days, and begins to react sluggishly to the treatment, increase to 15 to 20 lb. of SAPP to 50-gal. drum of water. Never use over 25 lb. per barrel. To prevent reducing drilling speed, the viscosity should be kept as low as economically possible, ordinarily at a maximum of 45-second funnel viscosity, but preferably from 35 to 40 seconds. This treatment will give a mud weight of 10.2 to 10.5 lb. per gal. without using weighting material. The SAPP treatment performs most satisfactorily after much of the material has been used. Experience has taught that it will continue to be effective over long periods of time and over long sections of drilling. It is necessary to continue the treatment after it is once started. If it ceases to be effective this means that the mud needs water. Never change treating chemicals unless the mud becomes contaminated with salt, cement, anhydrite, gypsum, or such. Other treatments will be effective for a few hours but the mud will be left in such condition that further treatment will not be effective. SAPP does not appear to overtreat as do some of the other phosphates; that is, after much treating some of the phosphates begin to increase the viscosity rather than decrease it. However, it should be pointed out that it is very easy to add more SAPP than is necessary. In many cases the use of SAPP has been cut from 400 to 500 lb. per tour to 50 lb. per tour, and the same results were obtained. As a general rule if 50 to 100 lb. of the material per tour is not sufficient to maintain a desired viscosity, the mud needs water.

Always add all of the water possible to the mud without reducing the density. That is, regulate the addition of the water by observing the mud weight; for example, if 10-lb.-per-gal. mud is desired and the weight is 10.1, more water is needed, but if the weight drops to 9.9, too much water is being added. However, usually a large volume of water may be added without reducing the weight of the mud. The weight of the mud is often increased when water is added, simply because as the water reduces the viscosity or gel strength, air and/or some other gases are freed from the mud. Usually treatment with SAPP will reduce the water loss of a natural-formation fresh-water mud, as well as fresh-water muds made from commercial clays. In some cases it may be necessary to increase the colloidal content of a mud made from natural-formation cuttings by addition of a Wyoming-type bentonite. Lack of water to give complete dispersion of clay particles will often cause a high water loss. In many cases water losses are reduced by adding water.

In areas where abnormal pressures are expected, and the mud program calls for an increase in mud weight, the program should specify that the mud weight be increased gradually, starting 500 ft. above the section and having at least a pound, and possibly a pound and a half, per gallon more mud weight than will be required to balance the calculated abnormal formation pressure. Keep in mind the fact that it is always much cheaper and easier to increase mud weights gradually. This can be partially explained by the fact that circulation is often lost when it is necessary to increase mud weight very fast, and an unbalanced mud column is obtained. This makes it necessary to use a larger quantity of mud materials. If possible always keep the mud column balanced; that is, have the weight as near the same all through the circulating system as possible, as well as the viscosity and other characteristics. This means if a barrel of chemical, weighting material, or clay is added, it should not be slugged into the mud in one spot but added over one or more complete circulation.

Drilling Low-Pressure Formations

In drilling low-pressure formations it is advisable to maintain a mud that gives a low water loss and as low a density mud as is possible to maintain and control all the exposed formations. Therefore such specialized muds as "oil-base muds" and "super - low - water - loss starch muds" or controlled-pressure drilling should be considered.

It is always advisable to drill through most low-pressure formations with as little differential pressure as possible. Of course, other exposed formations may have abnormal pressure, or may be loose, unconsolidated caving-shale formations, in which cases a high differential pressure may have to be maintained. It is possible to treat some types of clays and obtain at the same time a low-weight low-water-loss mud. However, it is usually impossible to carry the Wyoming-type bentonite mud, which gives the lowest mud weight of any of the clay materials, much below 8.8 to 9.0 lb. per gal. This weight has been decreased successfully in a few instances by gas cutting the bentonite mud, using gas containing some distillate. Dry gas will not stay in the mud.

The possibilities of using oil-base muds or starch muds, which give zero fluid loss or super low water loss, are being tried or seriously considered by many operators, and it is thought that one or the other, or both, will be better suited than a normal fresh-water mud for this type of drilling.

Controlled-pressure drilling should also be considered when drilling very low-pressure formations. Many operators have used methods involving drilling-in under pressure, and have permitted the well to flow during the completion.

From laboratory data, and some outstanding field experience, it is evident that water, particularly fresh water, entering certain sands impairs permeability of the sand, which, in turn, decreases oil productivity. There are some published data which indicate that it is practically impossible to withdraw fresh water from an oil sand.

From available data, it is obvious that every precaution should be taken to keep as much fresh water as possible out of the producing sands, especially subnormal-pressure sands.

(To be continued)

Maj. Gen. Harry H. Johnson, who was assistant to the vice president of Gulf Oil Corp., production division, Houston, when he was called to active military service in 1940, has been awarded the Bronze Star for "meritorious achievement in support of operations against the enemy" in the Pacific theater. General Johnson previously had served as military governor of Rome.

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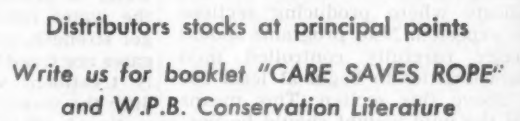

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ELECTRONICS

(Continued from page 128)

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Correction

Equations 8 and 9 appearing on page 98 of the June 2 Journal in the last installment of the Park Jones series on Mechanics of Producing Oil, Condensate and Natural Gas should have appeared as follows:

$$I = \left(\frac{N}{N+2}\right)\left(\frac{D}{R}\right)^{s} \quad (8)$$

where

N = number of injection wells
D = distance between the producing and injection wells
R = radius of a circular productive area $R \geqq D$

If the radius of a circular productive area is less than the radius of an injection circle, the corresponding invasion factor is defined by

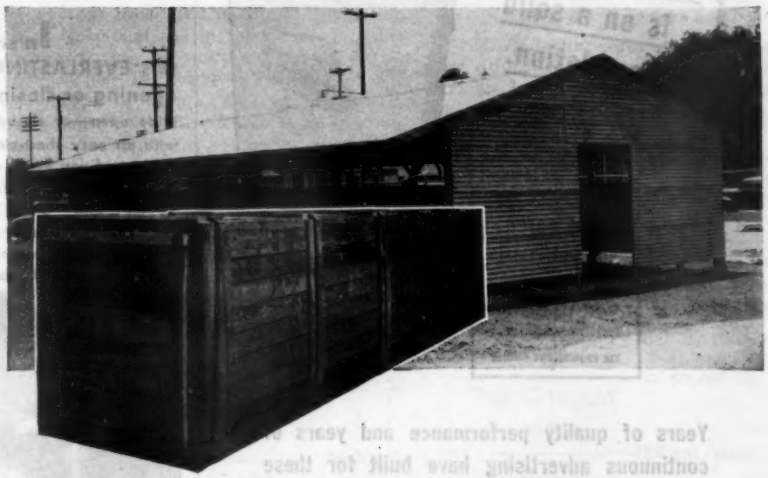
$$I = 1 - \left(\frac{2}{N+2}\right)\left(\frac{R}{D}\right)^{N} \quad (9)$$

Allen B. Gibson, formerly assistant director of production for District 3 (Southwest), Petroleum Administration for War, with headquarters in Houston, has been made director. He replaces **E. A. Wahlstrom,** who resigned to join Gulf Oil Corp. as division superintendent of production at Fort Worth. Gibson was a division engineer for Cities Service Co. from 1934 to 1941. Wahlstrom formerly served as field geologist and petroleum engineer for Midwest Refining Co. and as field engineer for Stanolind Oil & Gas Co.

W. O. Butler, formerly district drilling foreman for Union Oil Co. of California, has been advanced to general drilling superintendent, with headquarters at Santa Fe Springs. He succeeded **Frank Boyd,** recently appointed assistant to the manager of field operations.

Ralph Filmore, Anderson-Prichard Oil Corp., was elected president of Oklahoma City Geological Society at the annual meeting. **Roy McAninch,** Stanolind Oil & Gas Co., was reelected vice president, and **Carl Moore,** The Carter Oil Co., was chosen secretary-treasurer.

Donald W. Glendinning, who was senior technologist at the head office of Shell Co., Inc., at San Francisco, has been advanced to manager of distillation equipment at the company's Martinez refinery.



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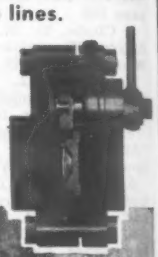

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Types of Reflux

IN No. 45 (June 2, 1945) on Tower Heat Balances, a so-called reflux heat of 5,286,000 B.t.u. per hour was computed for a 4,000-bbl.-per-day topping plant. This is the heat that must be removed from the top of the tower in order to maintain thermal balance. Many means of removing this heat have been developed, but they all involve condensation or cooling of some of the product or material in the top of the tower. The main difference between the different kinds of reflux (or cooling agent) is the temperature at which it is admitted to the tower as:

1. **Hot reflux** is a liquid reflux (or cooling agent) that is at the temperature of the top of the tower. Refer to (A) and (B) of Fig. 1. Thus, a pound of such reflux when admitted to the tower is (theoretically) neither heated or cooled; it removes only the heat of vaporization. It is computed by dividing the reflux heat by the latent heat of vaporization of the reflux. In this case (Notebook No. 45) the reflux is aviation gasoline which has a latent heat of 124 (Notebook No. 43, May 19, 1945) for a 67° A.P.I. intermediate paraffin base gasoline.

$$\frac{5{,}286{,}000}{124} = 42{,}500 \text{ lb./hour}$$

$$\text{or } \frac{42{,}500}{5.93} = 7{,}190 \text{ gal./hour}$$

$$\text{or } \frac{7{,}190}{60} = 120 \text{ gal./min.}$$

It may be produced by an outside exchanger (or cooler) as in Fig. 1 (A), or by cooling coils (or a tube bundle) inserted in the top of the tower as in Fig. 1 (B).

2. **Internal reflux** is defined as the reflux that flows from tray to tray inside the tower. It is always hot reflux because the liquids in a tower are always at their boiling points, but only at the top plate of the tower is the internal reflux numerically equal to the hot reflux computed above because at lower trays in the tower the reflux heat is different from that at the top, and the gravity and temperature of the internal reflux are different from those at the top of the tower. Note that the internal reflux at the top tray is always the same (i.e. 42,500 lb./hour) regardless of the type of reflux that is pumped or admitted to the tower from the outside. Internal reflux is shown on all of the sketches of Fig. 1.

3. **Cold reflux** is reflux that is cooled to lower temperatures than the top temperature and of course the lower the temperature of the reflux the less of it is required. A smaller quantity is required because such reflux must be heated as well as vaporized (see Fig. 1-C). If the reflux is cooled to 100° F. (see Notebook No. 40, April 28, 1945, for specific heat):

$$\frac{5{,}286{,}000}{124 + (240 - 100)\ 0.57} = 25{,}900 \text{ lb.}$$

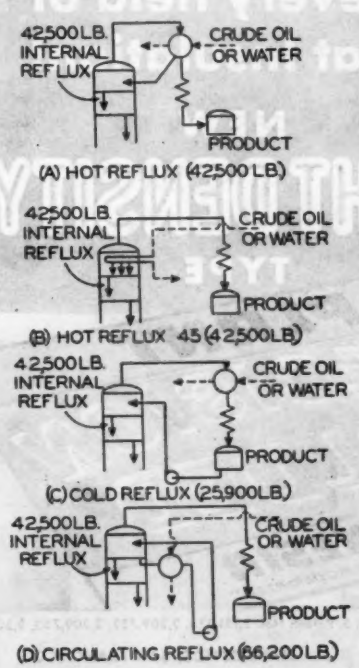


Fig. 1—Types of top reflux

$$\text{or } \frac{25{,}900}{5.93 \times 60} = 73 \text{ gal./min.}$$

4. **Circulating reflux** differs from the other types because it is withdrawn from the tower as a liquid rather than a vapor. Refer to Fig. 1 (D). It is fed to the tower at a low temperature and is withdrawn at a higher temperature. The bigger the temperature range the smaller the amount of reflux required, but since a temperature below 100° F. is seldom possible the amount of circulating reflux required usually exceeds the amounts of other types required.

$$\frac{5{,}286{,}000}{(240 - 100)\ .57} = 66{,}200 \text{ lb.}$$

$$\text{or } \frac{66{,}200}{5.93 \times 60} = 186 \text{ gal./min.}$$

In the extreme, enough reflux can be circulated through the top of the tower to cool and completely condense the overhead product so that no vapor (or product) issues from the top of the tower.

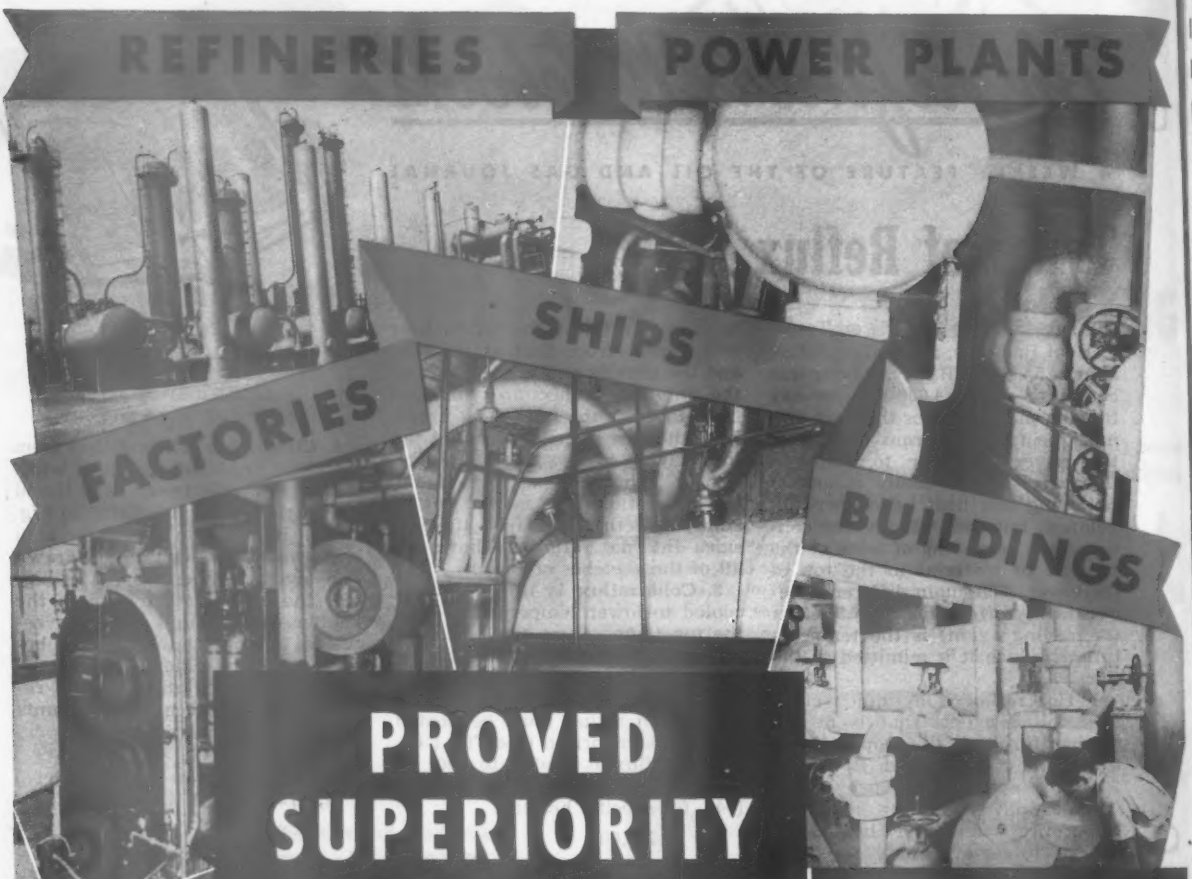
In addition, the tower can be cooled at lower points by what is called **side reflux.** This type of reflux will be discussed in Notebook No. 55.

Reflux ratio is defined as internal reflux divided by top product, using the same units (lb., gal., mols, etc.) for both quantities. Thus, for the 840-gal.-per-hour production of aviation gasoline of Notebook No. 45:

$$\text{Reflux ratio } \frac{7{,}190}{840} = 8.6$$

The smaller the amount of overhead product the larger the reflux ratio, e.g. had aviation gasoline and naphtha been taken overhead as one product the reflux ratio would have been only 4.1. Since internal or hot reflux can be obtained only by computation, plant operators often use cold reflux over product as the ratio. Such a quantity should be labeled as reflux ratio based on cold reflux.

No. 46 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



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Engineering Fundamentals No. 190

A FEATURE OF THE OIL AND GAS JOURNAL

Application of Water and Oil Production Data to Oil-Field Economics

Importance of records of oil-water ratios.—Production of excess water is detrimental to most oil reservoirs and costly to the oil operator. Arguments for water conservation are:

1. A barrel of water costs as much or perhaps a little more to pump (because it is heavier) than a barrel of oil.

2. Production of a barrel of water in reservoirs not under strong water drive may have the same effect as the withdrawal of a barrel of oil. It lowers the reservoir energy, decreases rate of flow of oil to the well, and hastens the time when production will be unprofitable. Data on secondary recovery indicate, in fine-grained sand, not under water drive, that water flooding is 200 or more per cent effective than gas repressuring. Therefore, for every barrel of fluid withdrawn from these low-pressure reservoirs a barrel of water needs to be put back into the sand at the proper point to maintain reservoir pressure and energy. Return of water to the formation can be an expensive operation. Hence every barrel of water unnecessarily withdrawn is a barrel of energy wasted.

3. When large quantities of water are produced with oil from reservoirs composed of fine-grained sands or oolitic limestones, water tends to migrate by capillarity into the sand around the periphery of a low-pressure, producing well. The water may form a capillary cone or capillary sheath, and the relative permeability to oil is greatly decreased, production of oil reduced, and water ratios increased. (See Engineering Fundamentals No. 177).

For these reasons, effective control of water encroachment into a reservoir and prevention of water entering a well unnecessarily are most important. Such control necessitates thorough knowledge of the producton data of the reservoir as a whole. These data may be obtained by (1) making a survey of the oil-water ratios of all the wells; (2) obtaining production rates of all wells; (3) measuring bottom-hole pressures of most of the wells; (4) measuring liquid levels in wells.

Methods of applying oil-water production data.—Methods of applying data obtained from production and pressure measurements can be best understood by giving specific cases of water wastage and how the wastage is prevented. Teague[1] cites an example from a nonpiercement-type salt dome in the Gulf Coast (Fig. 1). The field is under water drive from the west but the sand is fine grained and the drive is only of moderate strength. Thus, the field is able to maintain its bottom-hole pressure uniformly only at a certain moderate rate of production. If the edge leases in section "A," which lie directly in the path of the water drive, are permitted to produce a large volume of water in addition to the amounts specified in order to obtain uniform pressures, then the leases upstream in section "B" will not receive the benefits of the normal water drive. There the bottom-hole pressures will be reduced and lower recovery of oil will result. If the field happens to be in the pumping stage, the water drive is needed to maintain the fluid levels in the wells. If the pressure is lowered by excessive water withdrawal, fluid levels at once drop and lifting costs of pumping all the wells in this part of the field increase.

Under such conditions the wells making large amounts of water need to be closed down and worked over to exclude the water, and if water cannot be excluded, such wells need to be abandoned. Teague[1] points out that in Gulf Coast fields when the land ownership and lease ownership are diversified, proper management is difficult. It is, however, possible among an intelligent group of engineers to work toward a solution by reallocation of allowables and in some places by unitizing part or all of the field. In all cases costs need to be considered and weighed against ultimate returns the same as in all engineering work.

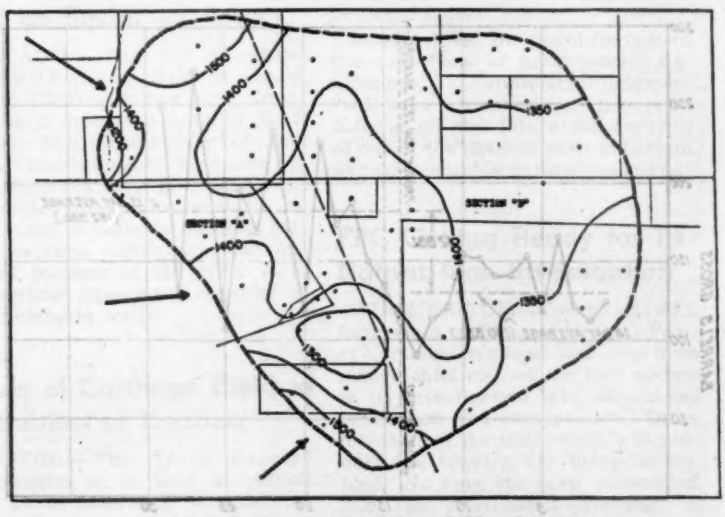


Fig. 1—Isobaric map of salt-dome field with strong water drive from north and west. (After J. U. Teague)

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

Engineering Fundamentals (Continued)

A FEATURE OF THE OIL AND GAS JOURNAL

Neptune[2] has described striking results obtained from a production survey of a small property in the Mid-Continent consisting of four or five wells. The property had been producing about 15 bbl. of oil daily for 3 years. The oil hardly paid for cost of operations, and the owner decided to clean out and repair the wells. First, a production test of each well was made. The results were as follows: The first well produced 33 bbl. the first day and 18 bbl. the following days. In other words well No. 1 alone pumped more oil than all the wells combined. Other investigations were at once made and it was found that well No. 1 was producing into a line which gathered oil from three other wells. Of the three other wells on the line, two were pumping once a week and one was shut down. It was found that the two wells which were pumped once a week were pumping up only the oil which was leaking back into the tubing through a faulty check valve from well No. 1 and that the idle well was also receiving oil from the good well. Further checking showed that practically all the oil from well No. 1, except 4 bbl. daily which was lost in the idle well, was being repumped from wells 2 and 3. The water from well No. 1 was going back into the sand in wells 2 and 3 completely killing the wells, and all the oil was being pumped off the top of the fluid column in those two water-logged wells. Needless to say, as a result of this survey, wells 2, 3, and 4 were abandoned and plugged, and oil was pumped only from well No. 1. This perhaps is a very exceptional case but illustrates strikingly the need for individual production tests.

The graph (Fig. 2) illustrates another case, furnished by Neptune,[2] vividly showing improvements in the production of a stripper well in the Yale district, Oklahoma, resulting simply from a change in production schedules. The pumping program was arranged so that the wells would pump only the head of oil, found by numerous measurements to be about the average maximum amount each well was capable of producing in a 24-hour period. The pumping was stopped and the well shut down for a period found by trial to be optimum for a maximum amount of oil to enter the well and then pumping was resumed. In this way pumping time was saved and the lifting of much water with little oil was prevented, since after the head of oil was pumped off the wells produced only large percentages of water. This method is applicable only in stripper wells where flow is due largely to gravity and low head of water in the well.

Another case described by Hill and Sutton[3] indicates the advantages of bottom-hole and squeeze cementing to repair wells making excessive water. A survey of the water-oil ratios in wells in the Powell field was made by the U. S. Bureau of Mines in 1924 and 1925.

TABLE 1—RESULTS OF CEMENTING TO EXCLUDE WATER IN POWELL OIL FIELD

Name of well—	Daily production before cementing, bbl. oil	Daily production before cementing, bbl. water	Daily production after cementing, bbl. oil	Daily production after cementing, bbl. water	Daily decrease in water barrels
J. K. Hughes, Hill A	25	4,000	270	0	4,000
J. K. Hughes, Hill B-1...	50	1,200	250	25	1,175
J. K. Hughes, Hill B-2...	50	300	225	15	285
J. K. Hughes, Hill B-3...	50	200	30	60	140
Mills Bennett, Wulten ..	100	5,000	250	0	5,000
Wheelock-Cullins, Hill ..	130	5,000	250	10	4,990
Stroube & Stroube, Hill.	270	5,000	500	0	5,000

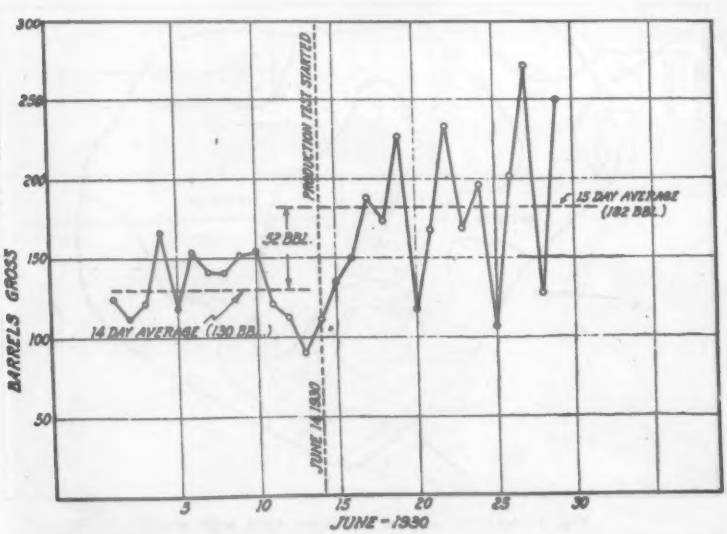


Fig. 2—Graphic chart showing effect on daily production in Yale district after production survey and change of pumping schedule. (After F. B. Neptune)

The wells making excessive amounts of water were cemented back at the bottom in an attempt to exclude bottom water. The results of the cementing, shown in Table 1, indicate that in this case the bottom cementing was quite successful.

Thus a careful survey of oil and gas ratios, pumping records, fluid heights, and bottom-hole pressures in most places will suggest many ways that the production of stripper wells may be improved.

References

1. Teague, J. U., Economics of Controlling Water Produced with Oil: Oil Weekly, pp. 30-40, November 18, 1940.

2. Neptune, F. B., Using Data from Individual Wells to Set Up Lease Potential and Production Ratio: Pet. Eng., Vol. 32, pp. 37-38, December 1931.

3. Hill, H. B., and Sutton, C. E., Production and Development Problems in the Powell Oil Field, Navarro County, Texas: U. S. Bur. Mines, Bull. 284, pp. 53-123, 1928.

Natural Gas

Eastern Companies Ask to Increase Their Facilities

PITTSBURGH. — Federal Power Commission held hearings here this week on applications of two companies for authority to increase their natural-gas facilities.

On June 12 the commission heard the request of New York State Natural Gas Corp. for the right to install a 500-hp. gas engine and compressor, new gas coolers, circulating pumps and other equipment, costing an estimated total of $51,790, needed to store additional gas to meet peak winter loads.

On June 13 The Manufacturers Light & Heat Co. presented its application for authority to construct 28 miles of pipe line ranging from 6 to 20 in. in diameter, and three 600-hp. compressors. The company seeks also to make transfers of equipment to accomplish more efficient operation.

A.G.A. Backs P.I.W.C.'s Policy on Natural Gas

NEW YORK.—American Gas Association has announced its support of Petroleum Industry War Council's declaration that any national oil policy should include natural gas. P.I.W.C. has proposed a broad set of principles to be applied to natural-gas output and in turn incorporated into any proposed national policy for petroleum. These have been approved by A.G.A.

P.I.W.C.'s proposals advocate private ownership of the oil and gas business; state jurisdiction over conservation and waste of oil and gas; competitive effort in the search for oil and gas, with freedom of individual action; and enactment of new state legislation or adaptation of existing statutes to promote development by producers of cycling representing projects.

A report by P.I.W.C. held that opposition by some states to exportation of natural gas to other states is without legal basis, but that jurisdiction of federal agencies over production and sale at the point where its interstate movement starts must remain with state regulatory agencies.

The report held that the end use of gas should not be regulated, since competition is the best arbiter in determining the best use of gas. It favored optional treatment of intangible drilling costs and the retention of present depletion allowances for tax purposes and the removal of the threat of double taxation on cycling and repressuring projects.

Texas U. Engineer Sought as FPC Adviser

WASHINGTON. — Federal Power Commission has invited Dr. E. P. Schoch, chemical engineer of University of Texas, to become one of its advisers on natural-gas questions.

Dr. Schoch said his acceptance will depend upon the university board of regents giving him permission to do part-time service with FPC. He has been closely associated with natural-gas research and investigations for several years. He believes the value of natural gas as a chemical component is so great that it should not be used promiscuously for such purposes as boiler fuel.

One of Dr. Schoch's projects has been developing a process for making cheap acetylene, basic ingredient for plastics, from natural gas.

PAW Designates Chitwood Field as Restricted Area

CHICAGO. — The new Chitwood gas-condensate field in Grady County, Oklahoma, has been designated as a restricted area by E. J. Bullock, director-in-charge of District 2, Petroleum Administration for War. No wells may be started, except under exceptions granted by PAW, until a suitable spacing pattern has been authorized. One important purpose of the order is to save critical equipment required at gas-condensate wells.

Sands of Carthage Field to Be Subject of Hearing

AUSTIN. — The Texas Railroad Commission is to hold a hearing June 15 to determine whether the Lower Pettit sand in the Carthage field, Panola County, should be considered as one producing zone or several.

At the same hearing the commission will receive evidence to determine whether or not the application granted to Glassell & Glassell and W. C. Feazel to use one meter and one flow line through which the gas from the various sands in the Carthage field could be measured, instead of a separate meter and flow line for each sand, should be rescinded, and to determine whether or not all operators in this field should be required to set separate meters and lay separate flow lines to segregate production from each zone as set up on the commission's proration schedule.

Supreme Court Is Asked to Review Louisiana Case

WASHINGTON. — Louisiana Conservation Department and Public Service Commission have appealed to the U. S. Supreme Court to reverse an order of Federal Power Commission allowing Memphis Natural Co. to build new lines from Lisbon, La., to Memphis for exportation of natural gas.

Once denied by the commission, the Memphis company's petition was granted in November 1944, and the order was upheld by the Fifth Circuit Court of Appeals.

The petition for Supreme Court review was presented by Atty. Gen. Fred S. Leblanc of Louisiana and Attorneys E. Leland Richardson, of Baton Rouge, and Sam H. Jones, of Lake Charles, former governor.

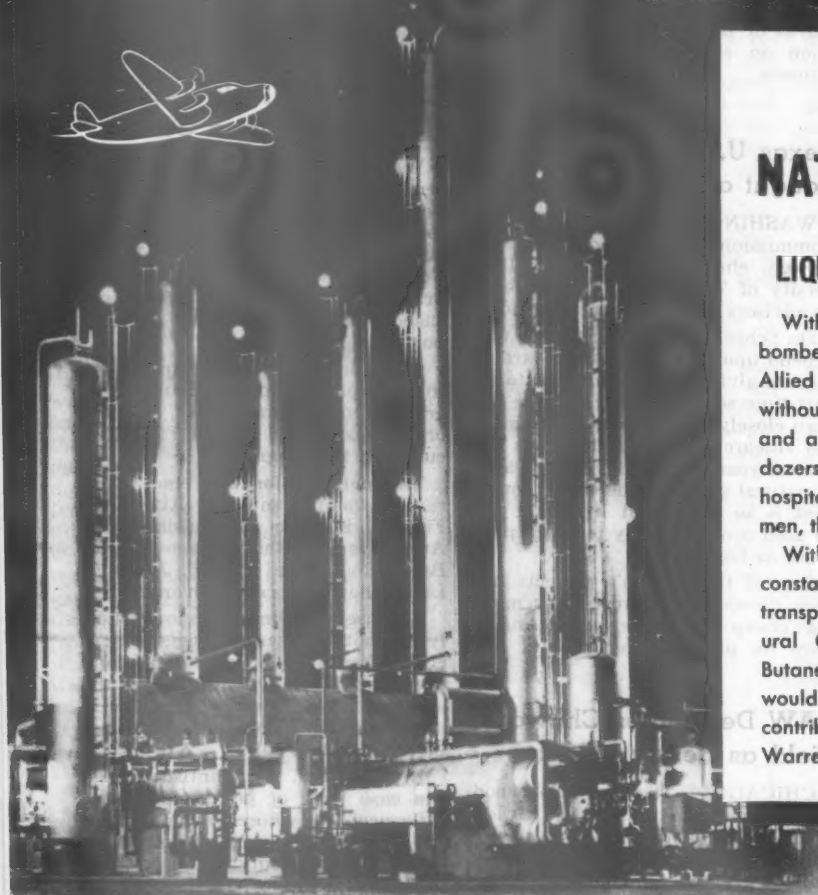
Because decisions to review usually are not made until briefs are received from both sides, the Louisiana appeal may lay over until after the summer recess. Even if the case is accepted, oral argument would not be heard before fall.

In their brief, the plaintiffs termed the case "one of great public significance" . . . whose final judgment "will have a tremendously important bearing on the future conservation of one of the nation's most important and irreplaceable natural resources."

FPC Getting Ready for Its Natural-Gas Investigation

WASHINGTON.—George Slaff, formerly a member of Federal Power Commission's legal staff, has been named chief counsel for that agency in its investigation into natural-gas production and conservation. Other members of the staff which will conduct the inquiry are being assembled. No date has been announced, but the commission indicated it would be "some time in the late summer or early fall." Independent Natural Gas Association of America is setting up legal and engineering staffs for a thorough presentation of the industry's case.

For global WARFARE



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REFINING

Allocation Control of Wax Put Under New Schedule

WASHINGTON.—War Production Board has placed crude scale and refined paraffin wax under the allocation control of Schedule 108 of Order M-300, the general chemicals allocation order, with a view of assuring that direct and indirect military needs are met.

The initial allocation date is July 1, and allocation is on a monthly basis. Schedule 108 provides a monthly small-order exemption of one short ton (2,000 lb.) per person monthly.

Producers are to submit immediately a proposed shipping schedule for June and, unless otherwise directed by WPB, they will be restricted to this schedule. Each schedule must show shipping point, weight in short tons, name of customer, prime contract number (if any) and customer's primary product, if known to the supplier. For shipments after June 30, suppliers are to file Form WPB-2946 on or before the fifteenth day of the month before the requested allocation month.

Indiana Standard Planning Postwar Improvements

WHITING, Ind.—Plans for large capital expenditures to improve postwar refining facilities and products were outlined by Dr. Robert E. Wilson, chairman of the board of Standard Oil Co. (Indiana), at the annual meeting here.

The company's administration is committed to the policy of expanding operations, Dr. Wilson said. It plans upgrading of products and research to develop new products as well as to assure success in making products from other raw materials than liquid petroleum. Transportation is to undergo important reorganization with a view to cheaper distribution. Marketing outlets are to be modernized.

Plans for the future are based, Dr. Wilson declared, on anticipation of conditions of free competition with other units in the petroleum industry. "We are convinced," he explained, "that vigorous competition, whatever its headaches for management, is a necessary and powerful stimulus for invention, improvement, change, growth, better service, and all the other attributes of a healthy and progressive economy."

Following the stockholders' meeting the board of directors reelected all former officers. They added two new officers by making Bruce K. Brown vice president in charge of development, and Buell F. Jones vice president and general counsel. Brown's title had been general manager of research and development and Jones' general counsel. Joseph K. Roberts, heretofore director of research, was promoted to general manager of research.

New Methods of Producing Butadiene Announced

WASHINGTON.—New methods of producing butadiene from diisopropyl and ethylene were covered in patents issued here last week.

Dr. Edward L. d'Ouville and Dr. Alex G. Oblad, research chemists for

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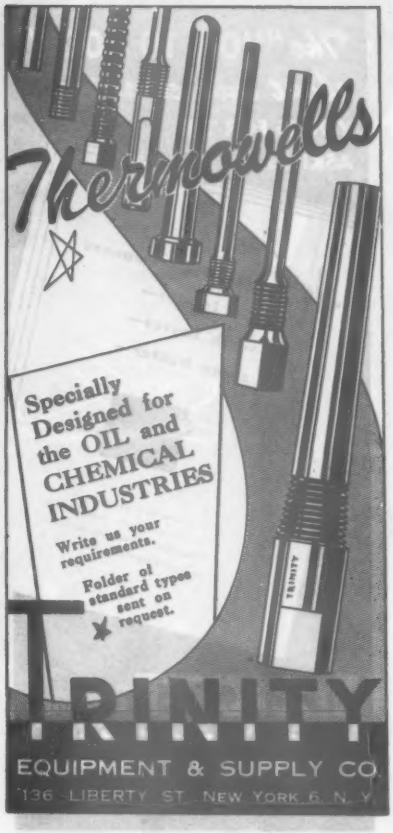
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the Standard Oil Co. (Indiana), won No. 2,376,961 on a new method of producing large yields of butadiene, a base of synthetic rubber, through the pyrolysis of diisopropyl (2, 3-dimethylbutane). Butadiene is now produced chiefly by the pyrolysis of various hydrocarbons and the yield is low in butadiene and high in gas.

The patented process calls for a charging stock containing a relatively high percentage of diisopropyl. This substance is unique among the hydrocarbons available for the manufacture of butadiene in that the primary product which can be derived from its thermal pyrolysis is the much-desired butadiene.

Diisopropyl does not occur in any significant amounts in crude petroleum or in the ordinary distillation products, but it may be synthetically produced on a commercial scale by the alkylation of isobutane with ethylene in the presence of an aluminum halide catalyst. To convert it into butadiene requires careful control, but pyrolysis can be handled at a temperature range of 1,350° to 1,550° F. with a reaction time of 1 second or less, at the lowest feasible pressure. Steam or carbon dioxide is used to repress undesirable secondary reactions.

The patent was assigned to the Standard of Indiana, Chicago.

Three other patents were awarded in the field of butadiene manufacture.

Bernard H. Shoemaker of Hammond, Ind., assignor to the Standard of Indiana, won No. 2,376,986 on a process of making butadiene by subjecting ethylene to controlled oxidation with air in the presence of an oxidation catalyst. Also assigned to the Standard of Indiana was No. 2,376,987, granted to Sam B. Becker of Chicago and Maurice H. Arveson of Flossmoor, Ill., on a method of preparing butadiene by charging a feed stock of ethylene oxide and ethyl alcohol to a catalytic conversion zone.

Harry Miller of Columbia, Mo., won No. 2,377,025 on a method of forming butadiene by passing a vapor containing acetaldehyde and ethylene at atmospheric pressure over a catalyst having a base of aluminum, magnesum, or zinc. The patent was assigned to the National Agrol Co. of Washington.

Indiana Standard Ahead of Time on Toluene Contract

WHITING, Ind. — Nine months ahead of time the new toluene plant here of Standard Oil Co. of Indiana has fulfilled its first contract with the Government's Ordnance Department.

Since the beginning of operations in September 1943 the plant has turned out 29,500,000 gal. of toluene—enough to provide the "T for TNT" in almost a half million tons of bombs. Production is continuing without interruption under a new contract. In a telegram to Robert E. Wilson, chairman of the board of Indiana Standard, Lt. Gen. L. H. Campbell, Jr., chief of ordnance, congratulated the Whiting workers on their achievement.

This one plant at Whiting is producing more toluene every day than was manufactured daily by all toluene plants in the United States in World War I.

Sinclair Hits 4,000,000-Bbl. Mark in Aviation Gasoline

NEW YORK. — Sinclair Refining Co. last week reported that its Houston refinery had produced the 4,000,000th bbl. of 100 - octane aviation gasoline. On May 25 the company's refinery at Corpus Christi produced its 2,000,000th bbl. Both plants have exceeded governmental contract requirements, Houston by 20 per cent and Corpus Christi by 10.

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PIPE LINES

Capacity of European Lines 150,000 Bbl. Daily

The military pipe line system completed in Europe has a capacity of 150,000 bbl. of gasoline daily through 3,446 miles of pipe, according to Col. Ernest O. Thompson, member of the Texas Railroad Commission who has recently returned to his office at Austin, Tex., after a tour to examine petroleum transportation methods in the European theater in order to gain information which would aid in dealing with the Pacific supply problems.

The materials used in all of our lines weighed 137,000 tons and paid for themselves in tonnage every 14 days, for 9,500 tons of POL (petrol, oil and lube) were moved daily without the turn of one wheel of a rail car or truck.

Thompson said he traced oil from America to the ports of embarkation across the Atlantic, up to the front line divisions from the English Channel to the Rhine, and up the Rhine. His itinerary also included the oil areas of Syria, Saudi Arabia and Algeria.

"We who were charged with the over-all responsibility of coordinating and putting into action this vast system of importation and distribution," said Thompson, "pay homage to the American oil men who gave their unstinted effort to winning the war.

"We pay tribute to the men who gave more than that—to those who gave their lives laying pipe line under fire, operating our plants in Antwerp through the torment of attack every minute of the day; to those who manned antiaircraft guns in the face of air attack to protect precious oil from destruction."

In news reels being shown at moving picture theaters this week, operations for laying pipe lines across the English Channel are shown with views of floating 40-ft.-diameter drums laying the pipe and several of the methods of handling this flexible pipe prior to winding on the drums.

WEP 20-In. Pumps More Products for Civilians

Shipments of products through the War Emergency Pipelines, Inc., 20-in. line are destined to a greater extent for civilian consumption than previously when it was engaged principally in moving military gasoline.

Unexpected developments have made possible the release of a few tankers from military to civilian service between Gulf Coast and East Coast points, according to a recent announcement by Deputy Petroleum Administrator Ralph K. Davies, who pointed out that the new program will keep civilian supplies moving to the East Coast when tank cars are being diverted to shipping petroleum supplies to the West Coast. In regard to this, Davies explained, "In the redeployment period of the war program, Petroleum Administration for War is confronted with the necessity of revising refinery schedules and reshuffling the entire transportation system—with resultant diversions in the movement of tank cars and the arrangement of pipe-line movements. All this involves some temporary loss of capacity." Loss of refinery output due to strikes and associated troubles will affect the supply of petroleum products on the East Coast as well as in other sections of the United States.

These problems, Davies said, accentuate the need for continuance of the fullest possible use of all production, refining, and transportation facilities.

The WEP 20-in. pipe line extending 1,475 miles from Beaumont, Tex., to Linden, N. J., has pumped 80,000,000 bbl. of military petroleum products into the New York Harbor area since it began operating early last year. Last week it began moving home-heating oil from Gulf Coast refineries and is scheduled to start pumping kerosene the middle

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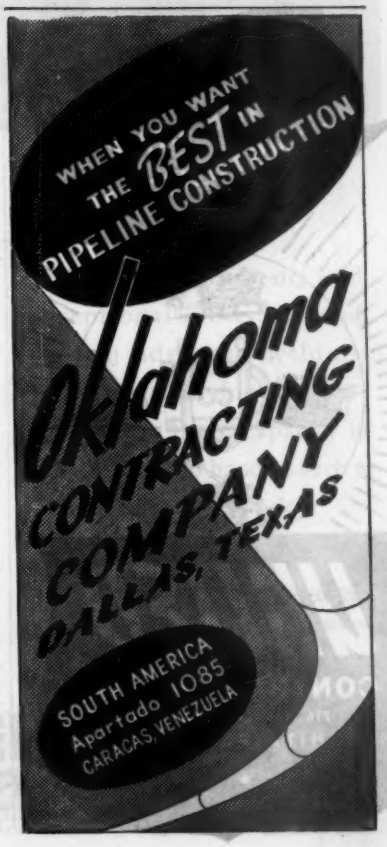

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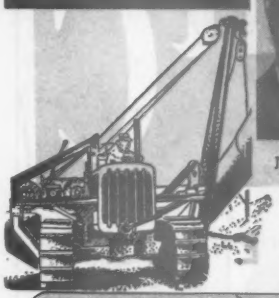
Partner



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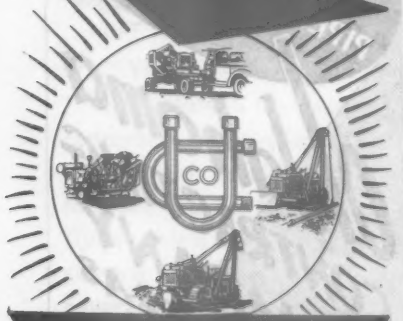

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of this month, Davies said. Last month 1,000,000 bbl. of housebrand (regular civilian grade) gasoline were moved through the line.

This pipe line will pump military gasoline during June but the greater part of its deliveries for the rest of the summer will consist of housebrand gasoline, kerosene, and home-heating oil.

During the week ending June 2 the "Little Big Inch" delivered 133,954 bbl. of petroleum products a day to the New York terminal area, compared with 193,596 bbl. a day the previous week. Both figures are below normal terminal deliveries, the decrease reflecting diversion of military gasoline to storage along the pipe line.

The "Big Inch" (24-in.) pipe line delivered 334,053 bbl. of crude petroleum a day to East Coast refineries last week and an average of 306,914 bbl. a day the previous week.

Tank-car movements of crude oil and petroleum products into the East Coast area averaged 477,436 bbl. a day last week, a drop of 28,347 bbl. a day from the week ending May 26. The difference was caused to some extent by decreased production resulting from a strike at a refinery in Port Arthur, Tex., and also by diversion of tank cars to meet Pacific war demands.

What has been accomplished in the wartime transportation program for maintaining stocks on the East Coast is reflected in Table 1.

TABLE 1—EAST COAST PETROLEUM STOCKS FOR WEEK ENDED JUNE 2, 1945
(Figures in barrels)

	June 7, 1941	May 26, 1945	June 2, 1945
Crude oil	18,078,000	16,365,000	16,595,000
Gasoline*	25,765,000	15,964,000	16,783,000
(Civilian grade)	.....	(9,355,000)	(9,648,000)
(Military and other)	.....	(6,609,000)	(7,135,000)
Kerosene	4,248,000	2,987,000	3,057,000
Distillate fuel oil	10,816,000	6,267,000	6,704,000
Residual fuel oil	7,842,000	5,773,000	6,327,000
Lubricants	3,172,000	2,839,000	2,838,000
Other products	10,381,000	9,617,000	9,907,000
Total	80,302,000	59,812,000	62,211,000

*Stocks of gasoline reported in 1941 were almost wholly civilian grade. Military or other gasoline stocks include aviation, military, solvents, or naphthas, gasoline blending stocks or unfinished gasoline.

Texas-Empire Loop Project Office at Boonville, Mo.

Texas-Empire Pipe Line Co. is supervising operations for looping and installation of pumping equipment from a field office at Boonville, Mo. By laying 164 miles of 12-in. in the Sheldon, Mo.-Heyworth, Ill., section the present loops will be connected to double the present line. Work is being supervised by staffs borrowed from subsidiaries of the parent companies, The Texas Co. and Empire Gas & Fuel Co., each of which owns a 50 per cent interest in Texas-Empire Pipe Line Co. according to "Empire," Cities Service Oil Co. publication.

Mechanical work of installing equipment will be supervised by Joe Davis, Texas Pipe Line Co., and Art Mason, Empire Pipe Line Co. Line construction will be supervised by Ben D. (Tex) Leuty, Cities Service Oil Co. E. O. Kesinger, Empire Pipe Line Co., is chief welding inspector.

Pipe inspectors are Bill Dulaney (Empire) and Larry Smith (Texas). Welding inspectors are: Gordon Crow, L. N. Barton, George Hill, and Clifford Bates from Texas Pipe Line; and Joe Sullivan and Wendell Kline from Empire Pipe Line. Coating inspectors are: Bill Stringer and Bob Mason of Texas Pipe Line. Ditching inspectors are: Cleve Bergen and Paul Ellis of Empire Pipe Line Co., and Homer Teel, Kaw Pipe Line Co.

THE HEART
OF THE LINE
X-L LINE PIPE
COUPLINGS
Our special process of recessing "X-L" Line Pipe Couplings assures perfect alignment, tighter joints and protection of vanishing threads giving longer life to the line. Made in strict accordance with A.P.I. standards in all sizes, black or galvanized. Tested by Comparator to insure maximum accuracy.
To avoid mistakes and save time, please use our catalog description when ordering couplings.
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WHEELING, WEST VA.

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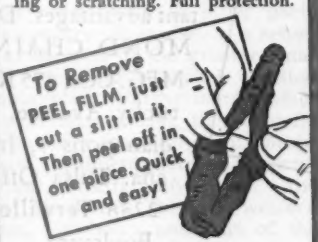
NOX-RUST PEEL FILM

SIMPLY DIP

THE PLASTIC PACKAGE

metal parts in NOX-RUST PEEL FILM. Dries quickly into a rubbery, plastic coating. Moisture can't penetrate. And cushiony PEEL FILM wards off damage from banging or scratching. Full protection.



PEEL FILM STRIPS OFF

The metal product emerges bright and shiny as the day it was immersed in PEEL FILM—free of rust; free of nicks or scratches.

PEEL NOX-RUST FILM
The Master RUST PREVENTIVE

NOX-RUST is available in many forms for varying requirements. PEEL FILM is the newest sensation in the big NOX-RUST family. Send today for a

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ASSOCIATED *Progressive* PIPING

MORE SERVICE ON ROTARY TABLE DRIVES

HELMERICH & PAYNE, INC.
415 PHILTOWER
TULSA, OKLAHOMA

January 15, 1945

Diamond Chain & Mfg. Company,
Tulsa, Oklahoma

Attention: Mr. John Wansley

Gentlemen:

At the present time we have 19 Wilson rigs in operation.

About two years ago we equipped our first rig with Diamond finished roller chain on our rotary drive, to which I would like to call your attention. This particular chain was put on when we started a well in West Texas, which drilled to a total depth of 9592 feet in 238 days; then the rig was moved to another well and drilled to 8616 feet in 102 days; then moved to another well and drilled to 2610 feet in 42 days; making a total of 20,818 feet in 382 days before this chain was taken off and changed, giving us much more service than any other make of chain or the ordinary old-style rotary chain. This was a Diamond finished roller chain. We are now changing all our big rigs to this type rotary drive, and buying all our new rigs equipped with this particular kind of chain, which has performed so efficiently.

It would be impossible for us to estimate the number of chains of the old-style necessary to drill this amount of hole or run 382 days without using this chain which we found to be satisfactory on its first trial. Not only do we get better service out of a Diamond roller chain on our rotary drive, but it has several other advantages such as running more quietly and smoothly and, also, saving wear and tear on the Kelly, Kelly Bushings and Rotary Table.

Yours very truly,

Helmerich & Payne, Inc.

By Herman Aweas
Drilling Superintendent

HA/lb

with Diamond Roller Chains Than with Any Other Make or Type of Chain

"On the rig we equipped with Diamond finished Roller Chain on rotary table two years ago, 20,818 feet were drilled in 382 days—more than with any other make or type of chain. We are now changing all our big rigs to this type rotary drive."

That's the experience of Helmerich & Payne, Inc. as reported by Mr. Herman Aweas, Drilling Supt. And note the last four lines of his letter for further very important advantages. DIAMOND CHAIN & MFG. CO., 475 Kentucky Avenue, Indianapolis 7, Indiana. Tulsa Office: 2238 Terwilleger Boulevard.

Herman Aweas, Drilling Supt., fourth from left, on the job with his men. The Diamond Chain Rotary Table Drive at extreme right is finished roller chain.

DIAMOND ROLLER CHAINS

Exploration and Drilling

Week's Highlights

UNION Oil Co. of California and Richfield Oil Co. 1 Kroell, SE NW NW 27-21s-46w, Prowers County, in southeastern Colorado, has tested a show in the Kansas City lime at 3,797-3,812 ft., only to turn out to be another disappointment

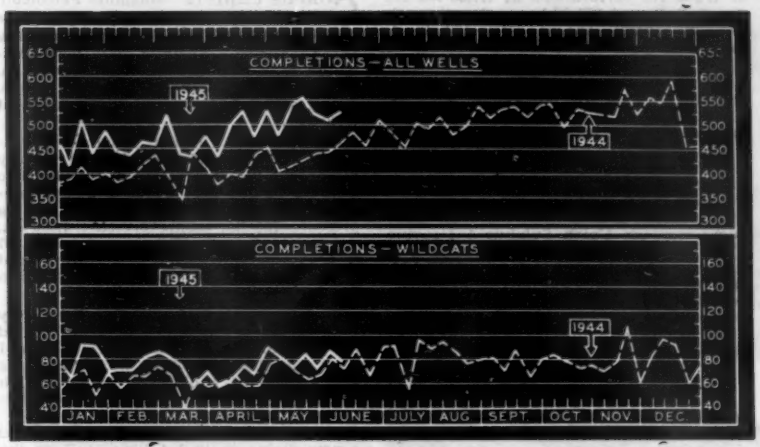
Oil men, not familiar with the regional geology that ties together in this area, are sometimes puzzled by the interest so many geologists display in wildcats drilled in this territory. But to geologists, this is the region where the Sierra Grande-Las Animas Arch of northeast New Mexico and southeast Colorado cuts across and forms the western boundary of the greater Anadarko basin, and the eastern boundaries of the Raton and Denver basins.

In itself it is a regional structural feature, similar to those on which oil has been found in other parts of the country. It is also, in a sense, part of the rim of the greater Anadarko basin, and as such is entitled to some play. Furthermore, somewhere in this district, there should be some clues that will clarify problems of sedimentation and corresponding stratigraphy from the Rocky Mountains through western Kansas, Oklahoma and part of the Texas Panhandle.

From a strictly geographic standpoint, it has been territory with reasonable prospects ever since the Texas Panhandle development, and this attractiveness has been enhanced by the generally westward creeping of the Kansas play.

There have been at least a dozen wildcats drilled in southeastern Colorado in the past 15 years, every one of which has been watched by a substantial number of geologists with great interest. If one should hit, a large number of other wildcats would be drilled. These might then yield information on sedimentation and structure that would help solve perplexing problems in areas quite some distance from this particular territory.

Most of the play has been too far northwest of the Oklahoma-Kansas south corner to suit those geologists who believe that the shelf area off the old Paleozoic positives is the controlling feature in oil accumulation in the entire region.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended June 9, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	1944
New York	12	0	*12	24	32,883	‡561	‡668
Pennsylvania	44	4	†33	81	146,143	‡1,637	‡1,523
West Virginia	0	10	2	12	39,126	335	356
Ohio	2	9	5	16	34,259	354	405
Indiana	3	0	3	6	14,276	75	95
Kentucky	8	3	7	18	29,546	176	282
Illinois	27	0	11	38	105,117	694	714
Michigan	10	0	6	16	37,605	325	257
Kansas	20	0	13	33	108,980	685	729
Nebraska, Missouri, Iowa	0	0	0	0	0	12	15
Oklahoma	29	1	17	47	203,386	1,029	698
Texas:	74	9	51	134	636,105	3,114	2,269
North Central	16	2	17	35	92,278	869	609
West	24	0	11	35	160,596	836	665
Panhandle	0	4	0	4	12,837	233	84
Eastern	2	1	1	4	21,277	133	142
Gulf Coast	24	2	15	41	285,652	733	436
Southwest	8	0	7	15	63,465	290	333
Louisiana:	13	2	8	23	194,832	431	317
Northern	3	1	2	6	30,504	141	119
Southern	10	1	6	17	164,328	290	198
Arkansas	1	0	0	1	8,334	75	91
Mississippi	6	0	5	11	77,293	154	47
Southeastern States	0	0	2	2	4,575	22	15
Montana	8	1	1	10	23,130	138	119
Wyoming	0	0	0	0	0	84	71
Colorado-Utah	1	0	0	1	6,242	14	13
New Mexico	4	1	3	8	29,243	204	178
California	37	1	6	44	175,928	1,013	838
Total United States	299	41	185	525	1,907,003	11,132	9,634
Total previous week	279	41	189	509			
Total June 10, 1944	228	65	168	461			

Service wells included: *12; †33. ‡Includes input wells.

SOUTH LOUISIANA

Barataria Field Gets New Deep Sand

NEW ORLEANS. — The California Co. opened the deepest sand in the Barataria field of Jefferson Parish at 32 Fleming Plantation 1, 1-16s-23e. Drilled to total depth of 11,560 ft. with 7-in. casing set at 11,558 ft., perforations at 11,488-536 ft., the well flowed 357 bbl. per day through 10/64-in. choke, gas-oil ratio 173 to 1, tubing pressure 1,810 lb., gravity 33.4°, 0.1 per cent water.

Union Sulphur Co. 1 Geo. R. Bradley, 51-7s-1e, in the Bayou Mallet area of Acadia Parish, is completed flowing 137 bbl. daily, no water, through 7/64-in. choke from perforations at 8,538-42 ft., tubing pressure 1,400 lb., gas-oil ratio 980 to 1, gravity 38°. This is a new sand for the field. Total depth is 9,712 ft. with 7-in. casing set at 9,523 ft. The discovery producer was the Union Sulphur 1 Marvine Kahn, which was completed through perforations at 9,610-14 ft., flowing 122 bbl. daily of 37.6° gravity oil on 7/64-in. choke, and showing 10 per cent salt water. The discovery was drilled to a total depth of 10,320 ft. before plugging back for completion.

Stanolind Oil & Gas Co. completed its 1 Ardoin-Conrad Unit, 37-3s-1w, at Pine Prairie field, Evangeline Parish, flowing 110 bbl. of 42° gravity oil per day through 10/64-in. choke, tubing pressure 1,215 lb., casing pressure 1,485 lb., gas-oil ratio 1,447 to 1.

Yegua Corp. 1 Guchereau et al, a wildcat in 71-9s-5e, has been abandoned at total depth 11,660 ft. Slight oil shows were found in sidewall samples at 11,392-96 ft. but not of commercial value.

SOUTH LOUISIANA WILDCAT FAILURES

Cameron Parish: Gulf Refining 1-C M. Gray et al, Johnson Bayou area, 15-15s-14w, dry, TD 11,842 ft.

Jefferson Parish: Texas Co. 1 State-Little Lake, Lease 533, in Little Lake18s-23e, dry, TD 12,033 ft.

LaFourche Parish: Atlantic Refining 1 Bowie Lumber Co., 7-14s-18e, dry, TD 12,208 ft.

SOUTHWEST TEXAS

Boyce Condensate Field Discovery Is Shut In

CORPUS CHRISTI.—Magnolia Petroleum Co. 1 W. W. Boyce, discovery of Boyce field, Goliad County, located in CCSD& RGNG Survey, Abstract 343, was completed as a gas-condensate well, shut in, no gage. Total depth is 8,500 ft. with 7-in. casing set at 7,805 ft. and perforations at 7,470-90 ft.

Bridwell Oil Co. 1-A Hertha C. Willmann, second producer for the recently discovered Willmann field in San Patricio County, flowed 132 bbl. on a 24-hour potential test through ⅛-in. choke. Tubing pressure 750 lb., casing pressure 1,600 lb., no water. Gravity 23°, gas-oil ratio 407 to 1. Production is from 12 perforations at 4,554-57 ft. Total depth is 4,812 ft. with 5½-in. casing at 4,627 ft.

A new deep sand for the Falls City field in Karnes County has been opened by Gulf Shore Oil Co. et al in their 1 A. F. Pawelek et al. This well is cleaning at the rate of 4 bbl. per hour through ⅛-in. choke through perforations at 6,032-38 ft. Total depth is 6,204 ft.

It is reported H. M. Naylor Oil Co. has a new discovery in 1 Lillian Muil, in the Bentonville area, 8 miles northeast of Alice, Jim Wells County. The well is flowing into pits while waiting on tanks, no salt water, tubing pressure 1,400 lb., casing sealed. The total depth of the hole is 6,400 ft. and perforations are at 4,080-85 ft.

Santa Clara Oil Co. and MaGuire Industries, Inc. 9 Yates, in Strake field, Duval County, flowed 87 bbl. on 24-hour potential test through ¼-in. choke, no water. Tubing pressure 160 lb., casing pressure 500 lb., gravity not reported, gas-oil ratio 250 to 1. Production is from 28 perforations at 3,224-32 ft. Total depth is 3,237 ft., with 5½-in. casing at 3,236 ft.

Atlantic Refining Co. 1 Mrs. A. M. Gordon, in Loma Alta field, McMullen County, was completed flowing 364 bbl. through ½-in. choke on a 24-hour test through perforations at 6,858-61 ft. Total depth is 6,865 ft. with 5½-in. casing set at 6,865 ft.

The name "Willmann" has been given the field discovered by Bridwell Oil Co. 1 Hertha C. Willmann, in the Delgado Grant, 1 mile southwest of Mathis, San Patricio County.

SOUTHWEST TEXAS WILDCAT FAILURES

Bee County: Dash Production Co. 2-C A. and M. Holzmark, in J. A. York Sur., Abst. 333, dry, TD 3,613 ft.

Kleberg County: Sam E. Wilson, Jr. 1 Joe Dvorak, Jr., King Addition 3, Sec. 8, 4 mi. west of Ricardo, dry, TD 9,133 ft.

Sam E. Wilson, Jr. 1 A. L. Kleberg, Kleberg T. & I. Co. subd., Sec. 1, 2 mi. northwest of Kingsville, dry, TD 7,534 ft.

LaSalle County: Quintana Petr. Corp. 3-F South Texas Syndicate, A. J. and J. J. Dull Sur. 112, dry, TD 5,737 ft.

Nueces County: Homer Easterwood et al 1 Mantor & Briggs, Mantor-Briggs & Kuykendall subd. of Casa Blanca and DeJaen Grants, dry, TD 7,306 ft.

Starr County: Glenda Oil Co. 1 F. S. Guerra, Porcion 109-111, Lot 17, Clark subd., 6 mi. southwest of Cuevitas field, dry, TD 2,068 ft.

Frio County: Humble 1 H. and R. C. Ross, in S. M. Williams and S. F. Austin Sur. 964, 2 mi. northwest of Hinds, 7 mi. southwest of Charlotte, dry, TD 8,600 ft.

EASTERN TEXAS

Fairfield Outpost Testing Travis Peak

DALLAS.—The Texas Co. 1 Sneed, B. Green Survey, ¾-mile outpost to 1 McKnight, gas-distillate discovery well 3 miles southwest of Fairfield in Freestone County, had porosity from 8,157-76 ft. and from 8,214-24 ft. in the Travis Peak. On a 4-hour drill-stem test from 8,260-74 ft., using 1,400 ft. of water blanket, there was a slight blow and water blanket and 350 ft. of gas-cut mud was recovered. Bottom-hole pressure was 700 lb. Total depth is 8,292 ft. in hard sand. Operator is preparing to reperforate. Shell Oil Co., Inc. and Lone Star Production Co. 1 Tandy, W. Martin Survey, deep test in the Buffalo Woodbine area, on a core from 10,083-92 ft. recovered 2 ft. of lime, 2 ft. of black shale, 2 ft. of silty lime and 1 ft. of calcarous sand. It is coring below 10,135 ft. with no shows reported.

Sinclair Prairie Oil Co. 1 D. D. Schofner, Wm. Dickerson Survey, deep test in the Chapel Hill field of Smith County, took a 15-minute drill-stem test at 9,675 ft., using 1,500 ft. of water blanket. Packer failed after 1½ minutes. The water blanket and 1,380 ft. of mud with no shows was recovered. It was drilling below 9,815 ft. in shale. Delta Drilling Co. 1 J. M. Christian, 1½ miles southeast of Sand Flat, recovered 4½ ft. of saturated sand from a 5-ft. core. Total depth is 7,044 ft. It was being cored again.

A new wildcat for the extreme west central part of Bowie County is Northern Ordnance, Inc. 1 J. L. Lumpkin, a Smackover test 3 miles southwest of Dalby Springs. It is 660 ft. out of the southwest corner of the E. F. Edwards Survey A-211.

EASTERN TEXAS WILDCAT FAILURE

Robertson County: W. V. Shaw and C. A. Riddle 1 J. C. Stephens, Jas. W. Hill Sur., 1½ mi. E Easterly, Wilcox 970, dry, TD 2,463 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	June 9 crude oil	Distillate, allied products	June PAW quota all oils	June 2 crude oil
Alabama	700	.....	400	450
Arkansas	79,150	5,000	85,000	79,900
California	940,350	60,200	1,007,200	937,750
Colorado	11,200	.....	10,500	11,250
Eastern	64,200	6,400	70,600	62,800
Illinois	200,400	12,000	212,000	200,800
Indiana	11,800	.....	13,000	11,600
Kansas	250,050	4,100	278,100	258,800
Kentucky	28,700	2,200	30,200	28,500
Louisiana	368,100	42,500	402,500	370,050
North Louisiana	69,150	.....	.....	70,250
South Louisiana	298,950	.....	.....	298,800
Michigan	48,200	700	47,700	46,850
Mississippi	51,750	.....	53,000	51,850
Montana	23,100	300	23,300	23,150
Nebraska	900	.....	1,000	900
New Mexico	104,350	5,000	110,000	104,150
Oklahoma	387,400	28,000	398,000	385,900
Texas	2,180,450	163,000	2,333,000	2,176,150
East Texas	377,600	.....	.....	379,800
East Central Texas	139,900	.....	.....	138,200
North Central Texas	154,650	.....	.....	153,900
Texas Panhandle	90,000	.....	.....	90,000
West Texas	497,550	.....	.....	495,300
Southwest Texas	357,700	.....	.....	355,650
Gulf Coast	563,050	.....	.....	563,300
Wyoming	100,250	3,100	116,600	102,200
Total United States	4,851,050	332,500	5,192,100	4,853,050
Change from previous week	down 2,000			

Total production January 1-June 9, 1945 ..... 765,435,000 bbl.
Same period last year ..... 713,529,660 bbl.

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Louisiana Pattern
CASING HEAD
with Split Gland and Seat

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Fig. A-101

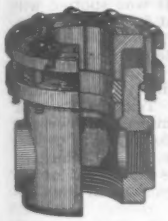

Fig. A-100

See Composite Catalog for complete list or write us for catalog.

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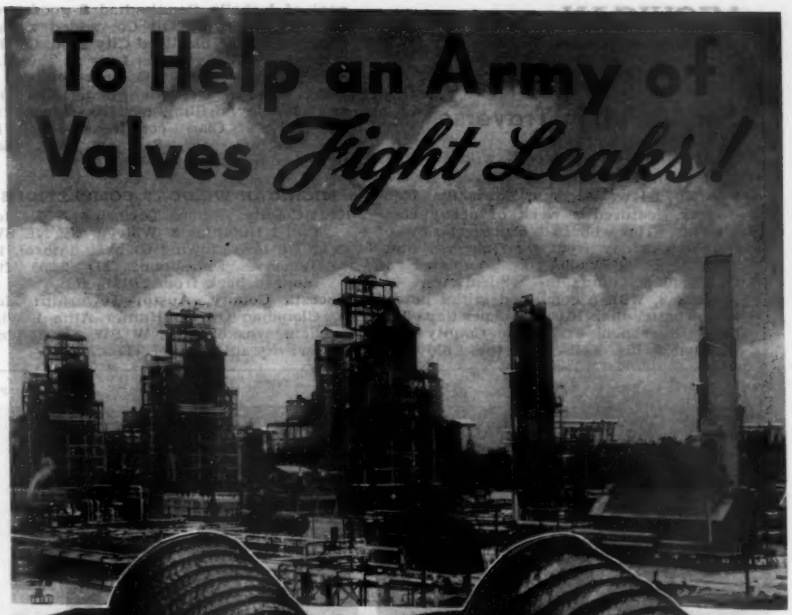

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This is for all general service on angle or globe valves having small packing spaces where high and low pressure steam, water, oil and air must be handled.

Made of Canadian long fibre asbestos yarn, carefully impregnated strand-by-strand with a heat resisting lubricant and thoroughly graphited before braiding or twisting.

Sizes: Style A-470, Braided — 1/8" to 3/4"; Style A-471, Twisted — 1/16" to 3/4".

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GOODALL RUBBER CO. OF TEXAS
Established 1870

MICHIGAN

Kent Co. Wildcat Good For 60 Bbl. in Traverse

SAGINAW.—A successful wildcat, S. L. McCall 1 Hutchins & Walven, NE NE SW 25-9n-11w, Algoma Township, Kent County, featured a week of heavy completions. The well had a natural flow of 60 bbl. per day from the Traverse lime. A total of 16 wells was completed, of which 10, including the wildcat, were oil producers, with a combined initial potential of better than 10,000 bbl. .per day. The Deep River pool in Arenac County contributed 2 big wells, and the Coldwater pool of Isabella County had 2 good producers. The Ohio Oil Co. added a fair producer in the old Reed City field. Of the 6 dry holes, 3 were gas tests in the Marion Township area of Osceola County.

The state conservation department issued 10 new drilling permits, 3 each in Allegan and Clare counties, 1 each in Newaygo, Osceola, Saginaw, and Van Buren counties.

MICHIGAN WILDCAT COMPLETIONS

Kent County, Algoma Township: S. L. McCall 1 Hutchins & Walven, NE NE SW 25-9n-11w; flowing 60 bbl., natural, in Traverse Limestone; TD 2,205 ft., plugged back from 2,213½ ft.

Mecosta County, Austin Township: McClanahan Oil Co.-Hunter Atha 1 William Waskowicz, NW SW SE 34-14n-9w; dry in Monroe; TD 3,781 ft.

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N. CENTRAL TEXAS

Sivell Bend Outpost Looking Good

WICHITA FALLS.—Sun Oil Co. 1 Mabie Field, 1-mile south outpost to the Sivell's Bend pool, took a 30-minute drill-stem test in the Strawn sand from 6,390-6,435 ft. and recovered 50 ft. of oil and gas-cut mud, 550 ft. of oil and no water. It was drilling ahead. The Texas Co. 1 Buckley, wildcat 15 miles northeast of Gainesville, attempted a drill-stem test from 7,750-7,800 ft., but the packer failed in 20 minutes. One thousand, eight hundred feet of fluid with no trace of oil or salt water was recovered. It was spotted with 60 sacks of cement and is waiting on cement. Total depth is 7,800 ft.

Mid-Continent Petroleum Corp. 1 Burnett, wildcat 3 miles southwest of the Ross pool in King County, is dry at 6,314 ft. in the Ellenburger. Texas 1 F. & M. Trust Co., wildcat 4 miles northwest of Childress in Childress County, was drilling below 3,470 ft. in shale. S. D. Johnson 1 Smith, wildcat 10 miles northeast of Paducah in Cottle County, was drilling below 4,673 ft. in shale.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCAT

Archer County: New pool—L. T. Burns 1-E Benson Est., Sec. 1808, TE&L Sur. A-503, 7½ mi. NE Olney, elev. 1,737 ft., Caddo 4,593 ft., pumped 70 bbl. day, perf. 4,594-4,600 ft., TD 5,428 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Wilder Drlg. Co. 1 W. H. Taylor and C. L. Abercrombie, J. W. Harris subd., 8 mi. SW Archer City, elev. 1,089 ft., dry, TD 1,500 ft.

Clay County: E. R. Perkins et al 1 Ray Stine et al, Blk. 62, Bacon subd., 4½ mi. NE Dean, elev. 986 ft., granite 2,890 ft., dry, TD 2,993 ft.

Wichita County: Fain & McGaha 1 Ed Henning, John Thomas Sur., 6 mi. NW Wichita Falls, elev. 1,032 ft., Ellenburger 5,186 ft., dry, TD 5,216 ft.

Wilbarger County: Miller Marine Decking, Inc. 1 William Bond, Sec. 32, Blk. 16, H&TC Sur., 10 mi. NW Vernon, elev. 1,272 ft., dry, TD 5,219 ft.

Young County: W. H. Peckham and Frank Wood 1 Strange & Pace, Lot 10, A. Rohus Sur. A-240, 4 mi. W Markley, dry, TD 754 ft.

WEST CENTRAL TEXAS

ABILENE.—The Texas Co. 1 Johnson, wildcat 3 miles north of Lueders in Jones County, recovered sand core bearing oil odor from 4,181-92 ft. On a 30-minute drill-stem test in the Strawn from 4,178-92 ft., 90 ft. of oil and gas-cut mud was recovered. It is drilling below 4,348 ft. S. C. Herring 1 Clark, northwest extension to the Reddin field in Taylor County, was trying to squeeze off water that appeared after it was treated with 1,000 gal. of acid in the Gunsight. Oil had been logged at 2,600-14 ft. E. J. Ruwaldt 1 Hughes, 1-mile south outpost to the Coker field, Coleman County, cemented casing after drilling saturated Morris sand from 3,119-29 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCAT

Shackelford County: New pool—H. P. Key 1 W. H. Green, Sec. 47, Blk. 11, T&P Sur., 8 mi. SW Albany, elev. 1,691 ft., Strawn 3,010 ft., pumped 99 bbl. day, perf. 3,010-17 ft., gravity 42°, TD 4,451 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Coleman County: C. P. Burton 1 P. L. Hays, Sec. 17, T&NO Sur., 1 mi. S Novice, elev. 1,987 ft., dry, TD 3,850 ft.

Eastland County: Milo E. Ritchey 1 Carrie Pence, TE&L Sur., 2¼ mi. SE Pueblo, dry, TD 2,265 ft.

Palo Pinto County: Edgar T. Hat 1 Mrs. W. J. Mallory, T&P Sur., 3½ mi. SW Baird, elev. 1,381 ft., dry in Ellenburger, TD 4,919 ft.

TEXAS GULF COAST

Hockley Dome Wildcat Recovers 36° Gravity Oil

HOUSTON.—Magnolia Petroleum Co. 2 Warren Ranch, a wildcat in Joshua Hudson Survey at Hockley dome, some 5 miles south of Hockley townsite in Harris County is creating much interest in the Gulf Coast. A drill-stem test at 5,684-5,731 ft., using ¼-in. chokes, open 8 hours, showed 75 lb. working pressure in 10 minutes, built up to 150 lb. working pressure, with 1,000 lb. bottom-hole pressure flowing. Pressure dropped off at the end of the 8-hour period and recovery was 2,400 ft. of 36° gravity oil. It is now drilling ahead at 6,050 ft.

A new producer at Smith Point field, Chambers County, is Standard Oil Co. of Texas 3-110 State-Galveston Bay, in Section 110. On a potential test this well flowed 217 bbl. per day through ⅛-in. choke from perforations at 8,132-38 ft. Tubing pressure 1,400 lb., gas-oil ratio 780 to 1, gravity 40.1°, 0.2 per cent water. Sand was topped at 8,132 ft. Total depth is 8,247 ft., with 7-in. casing set at 8,214 ft.

Houston Oil Co. of Texas and American Republics 1 Rice Institute, wildcat in Chas. Stewart Survey, Hardin County, was abandoned at a total depth of 9,258 ft. No commercial shows were found in either the Cockfield or Wilcox zones. This test was 7,426 ft. west of the 1 Hardin-fee, discovery well at Village Mills field.

Navarro Oil Co. (Continental) 1-A Foster Lumber Co., a wildcat in George Taylor Survey, Cold Springs area of San Jacinto County, was abandoned at a total depth of 9,738 ft. This failure is 4,750 ft. northeast of Navarro's 1 Foster, discovery Wilcox producer.

Magnolia Petroleum Co. has abandoned its deep test, 1-A Thompson-Long Leaf Lumber Co., in F. E. Willis Survey, in the Kittrell area of Walker County. On tests run in open hole below the 5½-in. casing, which was set at 9,960 ft., salt water was recovered, and tests through perforations at 9,916-24 ft. also showed water. Woodbine was topped around 9,950 ft. Total depth is 9,981 ft. in the Woodbine.

UPPER GULF COAST WILDCAT FAILURES

Brazoria County: C. H. Alexander 1 J. J. Settegast, Warren D. C. Hall Sur., Abst. 70, 3 mi. southeast of Pearland, dry, TD 6,292 ft.

Hardin County: Houston Oil Co. of Texas and American Republics 1 Rice Institute, Chas. Stewart Sur., Abst. 460, in Village Mills area, dry, TD 9,250 ft.

Harris County: General Crude Oil Co. 1 Mrs. Harold Bishop, in W. M. Francis Sur., 3 mi. southeast of Cypress, dry, TD 7,705 ft.

ElTex, Ltd. 1 Henry Koinm, in A. Mays Sur., 2 mi. east of Westfield, dry, TD 7,517 ft.

Jackson County: Butcher-Arthur, Inc. 1-A L. Ranch, in Santa Teresa Sur., Lot 17, 1½ mi. southeast of LaWard, dry, TD 7,045 ft.

H. J. Porter 1 Joe Volkmer, Tacitus Clay Sur., Abst. 14, 7 mi. north of Edna, dry, TD 2,826 ft.

San Jacinto County: Navarro Oil Co. (Continental) 1-A Foster Lumber Co., in Cold Springs area, in Geo. Taylor Sur., Abst. 292, dry, TD 9,738 ft.

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CALIFORNIA

Kettleman Middle & South Domes to Get Eocene Tests

LOS ANGELES.—The Middle and South domes of Kettleman Hills have come back into the limelight again after an absence of several years during which all but one of former Temblor producing wells in the Middle dome were abandoned and exploration work stopped in both areas. Los Nietos has already started down in the South dome and plans have been completed to redrill and deepen an old Temblor sand well in the Middle dome. The objective of both tests is the Avenal sand of Eocene age. The Eocene has been found productive in the North dome but has not been tested in either the Middle or South domes.

Structurally, South dome is the highest of the three domes comprising Kettleman Hills, and Middle dome is the lowest. Middle dome has a closure of approximately 900 ft. but some question exists with respect to the South dome, the axis of which appears to continue toward Lost Hills where Standard is drilling a deep test on the Cahn property in Section 4-27s-21e.

Buena Vista Hills appears well on its way to exceed production of the Elk Hills field as current production has just passed 53,000 bbl. per day. Peak production appears to be several months away. Drilling time from spudding to completion ranges from 14 to 20 days, with producing sand depths from 3,500 ft. to 4,300 ft., depending upon location on the structure.

The second well of Texas Co. in the Ramona field, located immediately west and north of the Del Valle field, does not look any too good at the present time, because it is not correlating any too closely with the discovery well. In the meantime, Texas has staked location for an outpost about 1 mile west of the discovery well along the strike.

Chanslor Canfield Midway Oil Co. has just about finished necessary remedial work on 1 Sanborn, in the Newhall-Potrero district, now that the casing has been repaired, the crew has started cleaning out to bottom preparatory to drilling ahead. This hole showed some encouragement while being drilled but failed to get production and has been standing suspended for about 2 years. The present objective is the middle and lower Miocene and possibly the upper Eocene if it is not too deep. With 7,327 ft. of hole already made and cased off, the play was sufficiently attractive for C. C. M. Oil Co. to drill ahead for a look at the next 4,000 or 5,000 ft. of hole.

CALIFORNIA WILDCAT FAILURES

Orange County, Newport-Costa Mesa: National Iron Works 1 Deeble, 18-6s-10w, bottomed in gray sand, no oil sand found in section, TD 2,750 ft.

Santa Barbara County, Buellton: Richfield 1 Skytt, 4-6n-32w, bottomed in sandstone, only minor showings logged, TD 6,001 ft.

Tulare County, Pixley: Shell 36-1 Parson, 1-23s-25e, bottomed in hard gray sand, electric log and side wall sampler negative, TD 5,485 ft.

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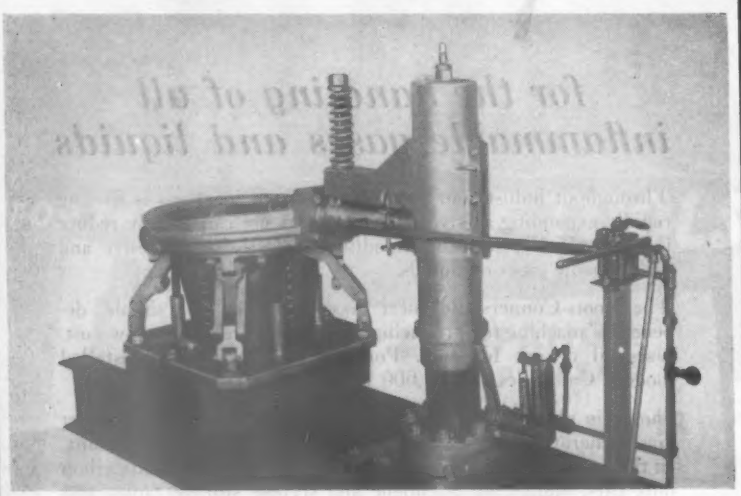

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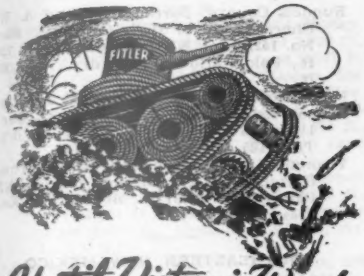
PERMIAN BASIN

Pre-Permian Tests Dominate Wildcat Activities

MIDLAND.—Atlantic Refining Co. 1-A University, wildcat 6 miles west of the McElroy pool in eastern Crane County, took a 60-minute drill-stem test in the lower Devonian from 8,510-66 ft. The recovery was 15 stands of free oil and 3 stands of drilling mud. In early May, a 60-minute drill-stem test of the upper Devonian from 7,913-8,024 ft. recovered water blanket heavily cut with gas and distillate. It is now drilling below 8,624 ft. in lime and chert. Humble Oil & Refining Co. 1 Cowden, wildcat 2 miles west of the Crane Cowden field in southeastern Crane, is drilling below 5,508 ft. in lime.

Andrews County.—Chalmette Petroleum Corp. 1 Lake Shore Corp., San Andres discovery, 1½ miles north of the Fullerton pool and the same distance east of the Union pool, has been completed for 40 bbl. of 35.2° gravity oil in 24 hours through perforations from 4,530-4,650 ft. Total depth is 7,636 ft. Magnolia Petroleum Corp. 1 Joseph Martin, wildcat 2, miles south of Devonian production in the Fullerton pool is considered dry, having failed to develop production at either total depth of 10,118 ft. or plugged-back depth of 4,668 ft. Humble 88-X Means, deep test in the Means field, was drilling below 11,220 ft. in lime. Shell Oil Co., Inc., and The Texas Co. 1 Ratliff & Bedford, prospective producer from the lower Permian, Devonian and Silurian, was drilling below 10,679 ft. in shale and lime.

Ector County.—Sinclair Prairie Oil Co. 1 Williamson, wildcat 3 miles northwest of the TXL pool, showed staining and odor of oil in the Devonian from 7,883-7,940 ft., total depth. A drill-stem test will be run at this depth. Atlantic 1-A TXL, southeast offset to Rowan Drilling Co. 1 TXL, second Devonian discovery in the TXL pool, made a 75-minute drill-stem test from 7,332-7,475 ft. and recovered 728 ft. of oil-cut drilling fluid. On a 2-hour drill-stem test from 7,460-7,525 ft. there was gas to the surface in 1 hour and 25 minutes and 900 ft. of mud cut with oil and gas was recovered. It is drilling ahead at 7,686 ft. in lime. Phillips Petroleum Corp. 1-B TXL, ½ mile north of Rowan 1 TXL, on an 89-minute drill-stem test from 7,819-7,949 ft., flowed mud



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in 16 minutes and oil in 19 minutes, flowing 11 bbl. the last 70 minutes. The well was deepened to 7,994 ft., where another drill-stem test will be run with packer set at 7,949 ft.

Crockett County.—Ledge Petroleum Co. 1 Bouscaren, deep test in the Noelke pool, shot 240 qt. from 3,961-4,042 ft., cleaned out to 4,042 ft. and flowed 25 bbl. of oil in 25 minutes, going dead. It is being swabbed. Richfield Oil Corp. 1 Bean, wildcat 6½ miles east and 1½ miles south of the Todd Deep field, is dry in the Ellenburger after no shows of oil or gas were recovered from drill-stem test from 8,696-8,806 ft.

Winkler County.—Sun Oil Co. 2 Keystone is the first Silurian producer in the multiple-pay Keystone field. It was completed for 63 bbl. of 31.4° gravity oil in 24 hours from 8,460-8,594 ft. Stanolind Oil & Gas Co. and Shell 1 Waddell, ¾-mile northwest outpost to the Wheeler Devonian-Ellenburger pool, recovered 90 ft. of oil-cut mud and 150 ft. of gas-cut mud on a 60-minute drill-stem test from 9,274-9,347 ft. On a later 60-minute drill-stem test from 9,346 ft., 30 ft. of gas-cut mud and 360 ft. of oil-cut mud was recovered. It is being deepened.

WEST TEXAS WILDCAT FAILURES

Gaines County: Honolulu Oil 1-98 D. E. Cunningham, Sec. 98, Blk. G, W. T. Sur., 6 mi. NE Seminole, elev. 3,244 ft., dry, TD 5,478 ft.

Martin County: Magnolia 1 Wolcott Ranch, Lg. 252, Ward CSL, 6 mi. S Patricia, Dawson Co., elev. 2,892 ft., San Andres 4,270 ft., dry, TD 5,321 ft.

Pecos County: Humble 2 H. O. Word, Sec. 601, Mrs. E. J. Carlton Sur., 10 mi. NE Ft. Stockton, elev. 2,724 ft., Ellenburger 7,650 ft., dry, TD 8,228 ft.

Phillips 1-A Manley, Sec. 217, Blk. 10, GH&SA Sur., 35 mi. SW Ft. Stockton, elev. 3,458 ft., dry in Delaware, TD 4,655 ft.

Runnels County: Barron Kidd and A. W. Cherry 1 T. C. Hall, Carpenter Sur. No. 152, 5 mi. NE Ballinger, elev. 1,726 ft., Palo Pinto 3,927 ft., dry, TD 4,001 ft.

Upton County: J. W. Ellis & Sons 1 Burleson Est., Sec. 76, Blk. 35, H&TC Sur., 1½ mi. S McCamey, elev. 2,447 ft., dry, TD 3,125 ft.

Yoakum County: Honolulu Oil 5 Theo Hertel, J. H. Gibson Sur., 12 mi. NE Plains, elev. 3,607 ft., dry in San Andres, TD 5,400 f.t

SOUTHEASTERN NEW MEXICO

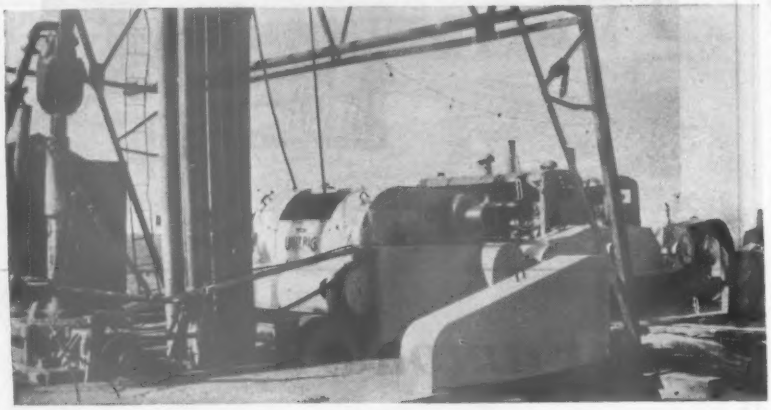
HOBBS.—The Texas Co. 1 Blineberry on the northwest side of the Penrose Deep field in Lea County, is testing through ¾-in. choke from perforations at 5,610-25 ft. On the last gage, the well flowed 33 bbl. of oil in 30 hours. McElvain Bros. 1 Seale, wildcat 5½ miles southwest of the Vacuum pool, was shot with 760 qt. from 4,674-4,804 ft., and made 8 bbl. of fluid in 2 hours, cut 30 per cent basic sediment and water, after 18 hours' shutdown. Total depth is 4,900 ft. It is shut down for orders. Phillips Petroleum Corp. 4 Lea-Mex, wildcat northeast of the Maljamar field, was drilling below 12,562 ft. in unreported formation.

Continental Oil Co. will drill 1 Mullis-Federal Permit, a 5,200-ft. wildcat in Chaves County, approximately 20 miles northeast of Artesia in 21-15s-29e.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURES

Chaves County: Geo. P. Livermore 1-B Williams, 3-13s-31e, 2 mi. S Caprock pool, elev. 4,441 ft., dry, TD 3,025 ft.

Lea County: Skelly 2 E. L. Steeler, 17-23s-37e, 6 mi. SW Gulf 1 Drinkard, elev. 3,333 ft., Clearfork 5,400 ft., Tubb 6,140 ft., dry, TD 7,200 ft.



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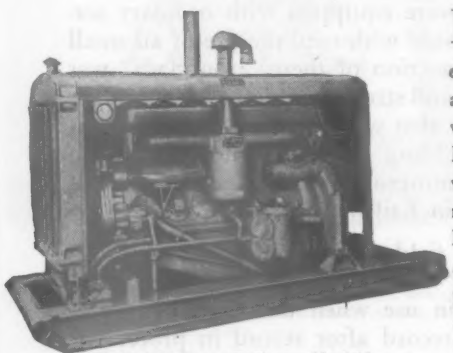

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KANSAS

Chitwood Edge Well Made From Dry Hole

LION Oil & Refining Co. 1 Chitwood, SW SE SE 15-28-12w, in Pratt County, on the north edge of the Chitwood pool, is producing about 45 bbl. per hour after being plugged as a dry hole in February, 1944. After considering data on the well as compared with surrounding wells, Lion drilled out and re-worked. The old total depth was 4,620 ft., and operators drilled and cleaned out the hole to 4,405 ft., and perforated at 4,362-74 ft. The well flowed 45 bbl. per hour for three hours, and after being shut in for eight hours, a thirty-minute test yielded 30 bbl. Production is from the Viola.

Skelly Oil Co. 1 Starkey, SE SE NE 33-28-7e, in Butler County, has reported a good show of oil in the Mississippi lime at about 2,822 ft. The well is now drilling at 2,850 ft., with tops called as Kansas City 2,096 ft., and Mississippi 2,820 ft. Closest production is in the Brandt pool, two miles to the northeast.

Amerada Petroleum Corp. 1 State of Nebraska, SE NE SE 16-33n-49w, just east of Chadron in Dawes County, Neb., is considered dry after a drill-stem test recovered only mud and water. Total depth of the hole is 4,494 ft. in granite, and the first drill-stem test, at 4,432-94 ft., recovered 930 ft. of water in 1 hour. Operators perforated at 4,045-60 ft., and the second drill-stem test, open 4 hours, recovered 120 ft. of mud and 1,080 ft. of water.

KANSAS WILDCAT FAILURES

Barton County: Ainsworth Bros. 1 Fenn, SW SW NE 7-19-14w, dry, TD 3,605 ft., elev. 1,929 ft., Arbuckle 3,572 ft.

Kiowa County: Stanolind 1 Zentz, SW SW SW 29-29-18w, dry, TD 5,440 ft., elev.

2,189 ft., Viola 5,097 ft., Simpson 5,342 ft., Arbuckle 5,383 ft.

McPherson County: P. B. Allison 1 Stucky, SW SW NE 14-21-2w, dry, TD 3,020 ft., elev. 1,487 ft., Mississippi lime 2,947 ft.

Marion County: Phil Han 1 Klassen, SW SE SE 18-21-1e, dry, TD 3,620 ft., elev. 1,528 ft., Mississippi lime 3,390 ft., Hunton 3,391 ft., Crystalline Viola 3,483 ft., Simpson Dol. 3,498 ft., Simpson sand 3,516 ft., Arbuckle 3,585 ft.

Rice County: Shaffer Drilling 1 Inscher, SE SE SW 7-21-9w, dry, TD 3,425 ft., elev. 1,694 ft., Viola 3,303 ft., Simpson shale 3,324 ft., Simpson 3,353 ft., Arbuckle 3,394 ft.

Stafford County: Champlin 1 Guthrie, SW SE NE 10-25-11w, dry, TD 4,118 ft., elev. 1,800 ft., Kinderhook 3,832 ft., Mississippian 3,903 ft., Simpson shale 4,015 ft., Arbuckle 4,090 ft.

FOREST CITY BASIN

ST. JOSEPH.—Fell & Reid No. 1 Fred Klam in C SE SE SE 19-51n-33w, Platte County, Mo., northeast of Parkville, was plugging back to test gas showings. Total depth was 1,750 ft., Arbuckle lime top 1,714 ft.

OHIO, KENTUCKY

Gilmore Gas Field Extended North

COLUMBUS.—The new Gilmore gas pool was further extended ½ mile north by E. P. Mellon 2 Esther Booth, Lot 38, Washington Township, Tuscarawas County. First gas was at 1,236 ft., increased to 2,459,000 cu. ft. at 1,241 ft. Top of the Berea sand was reached at 1,184 ft.

Belmont Quadrangle 11 Cleveland Metro. Pk., Lot 93, Hinckley Township, opened up an additional small area along the south part of the Hinckley field in Medina County. Clinton sand at 3,222-3,281 ft. gaged 1,250,000 cu. ft. Two offsets to the well have been made.

Ohio Fuel 1 Elmer Cornell, Section 28, Ripley Township, Holmes County, extends the Big Prairie pool a location northeast. Clinton sand at 3,144-3,209 ft. gaged 2,110,000 cu. ft.

WESTERN KENTUCKY

OWENSBORO.—The North Utica pool in Daviess County was extended by a 110-bbl. well in Tar Springs sand, and a 7,000,000-cu. ft. gas well was completed in Grayson County. The week's crop of completions in western Kentucky included four oil wells, one gas well and four dry holes. Two of the failures were wildcats.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Daviess County: Dale Goodson 1 O'Flynn, ½ mi. S of Utica, Tar Springs sand 1,127-32 ft., TD 1,142 ft., IP 110 bbl. of oil. Extends North Utica pool.

Grayson County: Mid-West Chemical and G. E. Deaton 1 L. Decker, 5 mi. SE of Cameyville, Benoist sand 713-60 ft., TD 2,100 ft. Completed as a 7,000,000 cu. ft. gas well.

WESTERN KENTUCKY WILDCAT FAILURES

Union County: Fisher Oil 1 Greenwell Minerals, 1¼ mi. N of Waverly, dry at 2,616 ft. Glen Dean 1,976 ft. Cypress 2,290 ft., Aux Vases 2,522 ft., Ste. Genevieve 2,532 ft.

William Lacey 1 J. T. Thompson et al, 1¼ mi. N of Waverly, dry at 2,294 ft. Base of Barlow 2,249 ft. Cypress sand top 2,283 ft. No electric log taken.

EASTERN KENTUCKY

ASHLAND.—West Virginia Gas Co. completed No. 5,558 on the Henry Thornbury

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property, Mullins Branch of Right Beaver Creek, Knott County, at 2,025 ft., with an open flow of 1,639,000 cu. ft. from the Big lime. Same company completed No. 781 on the Clay Martin property, Jones Fork of Bear Creek, Knott County, at 2,550 ft., with an open flow of 355,000 cu. ft. from the Big lime and shale.

Patterson, Dyer & Rader completed No. 3 on the Wright Heirs land, Jackson County, at 1,072 ft. as a 4-bbl. producer. Red Rock Petroleum Co. completed No. 16 on the P. E. Caudill property, Magoffin County, at 1,056 ft., good for 7 bbl. Cumberland Petroleum Co. completed No. 63 on the L. C. Bailey property, Magoffin County, at 970 ft. as a 3-bbl. producer. Henry Ball completed No. 18 on the Kate Sawyer property, Estill County, at a depth of 540 ft., with daily estimated production of 2 bbl. of oil. Patterson, Dyer & Rader No. 4 on the Wright Heirs land, Jackson County, was a dry hole at 1,073 ft.

INDIANA

Evansville.—Three dry holes and three oil wells were completed in Indiana in the past week, one of the successful wells being a 250-bbl. completion in the Rebeyre Island pool in Posey County. Two of the failures were wildcats.

Four miles south of Evansville on the eastern side of the Heusler Dome pool in Posey County, Nash Redwine 2 Korff, SW NE SE 36-6s-12w, was given a 36-qt. shot in Tar Springs sand at 1,804-12 ft. the total depth and while being cleaned out swabbed at the rate of 10 bbl. per hour. Jarvis Bros. & Marcell 3 Gumbel, NE SW SE 36, a location southwest of the No. 2 Korff, cored the whole Waltersburg sand section from 1,764 to 1,800 ft. and found good saturation.

INDIANA WILDCAT FAILURES

Gibson County: Kingwood Oil Co. 1 Mumford Farms, NE NE NE 27-3s-13w, dry at 2,954 ft. Upper Menard 1,934 ft., Barlow 2,430 ft., Renault 2,663 ft., Ste. Genevieve 2,756 ft. No show of oil at any level.

Posey County: Morton Drilling and Siegel 1 Harry Ford, NW NW NE 15-5s-13w, dry at 3,046 ft. Lower Glen Dean 2,352 ft., Barlow 2,588 ft. No other tops available, but McClosky lime showed only water.

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ILLINOIS

High Average Initial Marks Past Week's Completions

THE Illinois Geological Survey's monthly bulletin of field operations in the state records that in May two oil pools were opened and six pools extended, while new pays were opened in two pools.

Willow Hill North, in Jasper County, and Odin in Marion County, were the newly opened pools. An extension well joined the Johnsonville and Sims North pools, which will hereafter be known as the Johnsonville Consolidated pool, Wayne County. Twelve old oil wells were reworked during the month, resulting in additional oil production.

Several wells were reported completed during the past week with initial output far above the average for the state. Notable among these were Pure Oil Co. 1 Obrecht, SE SW NW 6-1n-8w, in the Clay City Consolidated field in Wayne County, which flowed 932 bbl. in 24 hours from Rosiclaire lime at 2,987-92 and 3,001-12 ft., total depth 3,025 ft. The Texas Co. 1 E. A. Mitchell-B, SW NW SE 4,5s-3e. Ewing pool, Franklin County, good for 741 bbl. initially, from McClosky lime at 2,970-75 and 2,991-3,002 ft., the total depth, production coming through perforations at 2,970-76 ft.; F. A. Bridge's 2 Sager, NE NE SE 19-3n-9e, Noble pool, Richland County, which started at 490 bbl. per day from McClosky lime at 2,962-66 ft., which had been acidized, total depth 3,031 ft.; The Texas Co. 3 McKinney, NE NE NW 23-1s-3e, Divide West pool, Jefferson County, a 448-bbl. well from McClosky lime at 2,737-47 and 2,759-72 ft., total depth 2,850 ft.

Average initial production of all 26 new oil wells reported in the past week was 176 bbl. per day.

Forty-seven new operations were reported, including the following wildcats: George Schoonmaker 1 D. Berg, SE SW SW 22-1s-9e, Wayne County; Phillips Petroleum Co. 1 Holland, NW NW NE 13-4s-6e, Hamilton County; Nation Oil Co. 1 Upton, NW NE NE 30-4s-8e, White County; Skelly Oil Co. 1 A. Merkel, NE NW SE 3-5s-1e, Franklin County; Dale Hopkins 1 Myers, SE SE SW 25-8n-3e, Fayette County; Robinson & Puckett 1 R. Murphy, 330 ft. from south and 390 ft. from west lines NE SE 6-1s-8e, Wayne County; W. H. McKain 1 Beard, SW SW SE 26-3n-4e, Marion County; Co-Operative Refining Co. 3 Goodenough, NE NW SE 14-3n-6e, Clay County; The Texas Co. 1 R. Kagley, NE NE NW 16-1n-14w, Edwards County.

WILDCAT FAILURES IN ILLINOIS

Gallatin County: B. M. Heath 7 Ted Eubanks, SE NW SW 21-7s-8e, dry at 2,936 ft. Menard 2,033 ft., Barlow 2,581 ft., Cypress 2,631 ft., Benoist 2,750 ft., Aux Vases 2,889 ft., Levias lime 2,932 ft.

Jasper County: Texas 1 J. H. Wright, SW SW NE 6-7n-10e, dry at 2,799 ft. Tar Springs 2,008 ft., Cypress 2,352 ft., Benoist 2,524 ft., Aux Vases 2,587 ft., McClosky 2,692 ft., St. Louis 2,729 ft.

Jefferson County: W. O. Schock 1 R. Huff, NE SW NE 22-2s-4e, dry at 3,183 ft. Glen Dean 2,415 ft., Cypress 2,657 ft., Benoist 2,932 ft., Aux Vases 2,942 ft., McClosky 3,077.

Marion County: Texas 1 W. A. Kell, SE

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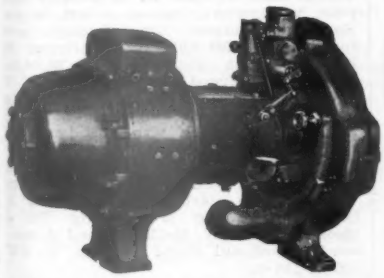

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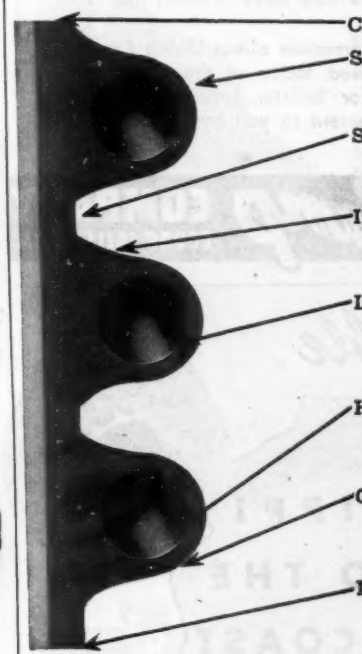

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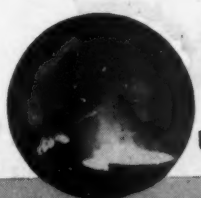

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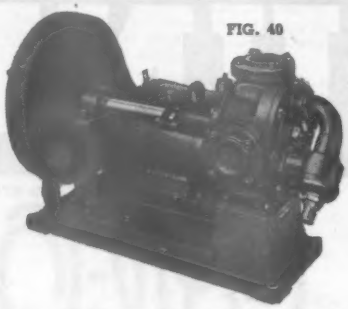

FIG. 40

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SE NE 3-1n-2e, dry at 2,344 ft. Upper Glen Dean 1,651 ft., Cypress 1,850 ft., Benoist 1,992 ft., Benoist sand 2,000 ft., Aux Vases 2,061 ft., McClosky 2,130 ft., St. Louis 2,336 ft.

White County: H. L. Luttrell 1 T. Aud, NE NE SE 21-6s-8e, dry at 3,348 ft., Clore 2,104 ft., Cypress 2,801 ft., Weiler 2,836 ft., Benoist 2,960 ft., Benoist sand 2,967 ft., Aux Vases 3,085 ft., McClosky 3,140 ft.

OKLAHOMA

Remote Kingfisher Test Shows Oil in Hunton

AFTER coring a showing of oil and gas in Hunton lime in 1 Triplett, C NE SW 8-15n-5w, Kingfisher County, Oklahoma, Gulf Oil Corp. was preparing to test the formation, topped at 7,362 ft., total depth 7,392 ft. (both corrected measurements). This test is 4 miles northwest of the nearest producing well in the West Edmond field and Gulf owns 18 quarter sections in the neighborhood. Carter, Phillips, Mid-Continent, Superior and Magnolia companies also own acreage thereabouts. Phillips Petroleum Co. and Carter Oil Co. have started a wildcat test, 1 Roffman, C NE NW 12-15n-5w, and were drilling below 2,000 ft. in 1 Jirick, C SW SW 26-12n-5w.

Sinclair Prairie Oil Co. et al 1 McDonald, NE NE NE 34-10n-3w, Cleveland County, extended the South Monroe pool more than ½ mile southwesterly. It flowed 122 bbl. of oil the first hour and 91 bbl. the second hour from Burgess detrital sand (Bartlesville), topped at 7,705 ft., total depth 7,900 ft. Casing was set at 7,877 ft. and pipe perforated at 7,850-68 ft. and 7,800-40 ft. with 232 shots in all.

Mid-Continent Petroleum Corp. 1 Turk, SW SW NE 29-10n-3w, on the north edge of the West Moore pool in Cleveland County, which had been abandoned in Wilcox sand at 8,080 ft. in October last year, was recently given a test in the Bartlesville-Burgess zone through perforations at 7,864-7,910 ft. and flowed 55 bbl. the first hour through 24/64-in. choke. It produced 384 bbl. of oil in 17 hours, with 1,000,000 cu. ft. of gas. Same owners are now working over 2 Tubbs, NE NW SE, which was abandoned at 8,895 ft. in Wilcox sand.

Two outposts east of production in the West Edmond field in Oklahoma County were due to start this week. One is Denver Producing & Refining Co. 4 Meeker, C NE SW, 10-13n-4w, and Anderson-Prichard Oil Corp. 1 Davis, C NW NE 22-14n-4w.

Two Pottawatomie County wildcats were given up as failures when they did not show commercial production in the Wilcox or other regional pays. They were Stanolind et al 1 Teas, NE SE NW 9-9n-4e, and K.G.F.F. Oil Co. 1 Bourbonnais, C NW SW 31-10n-4e.

A new producing zone was uncovered in the Cement field in Caddo County. H. W. Snowden et al 1 McDonald, Block 60, Cement townsite, or NW NW SE 3-5n-9w, filled a 1,000-bbl. tank in 4 hours, flowing from Middle Row sand zone at 4,102-60 ft. It was shut in awaiting additional tankage.

H. F. Wilcox Oil & Gas Co. developed production in its 1 Wister, a wildcat in Osage County, SW SE NW 15-22-8e, in the Hominy area. Burgess sand at 2,531-47 ft. yielded 120 bbl. in 8 hours on the swab.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Helmerich & Payne 13 Freeman, NE NE SW 15-1n-1w, 1,000,000 cu. ft. gas, pay zone 1,890-1,921 ft., elev. 858 ft., TD 2,503 ft., PBTD 1,950 ft.

Grady County: Chitwood condensate pool discovery — Magnolia 1 Cunningham, SE SE 33-5n-6w, elev. 1,152 ft., flowed 922 bbl. 54° gravity condensate in 24 hours, pay zone 10,879-82 ft., TD 10,891 ft.

OKLAHOMA WILDCAT FAILURES

Comanche County: J. S. Morris 1 Norton, SW NW NW 35-2n-10w, elev. 1,107 ft., dry, TD 1,425 ft., temp. aband.

Garfield County: Globe Oil & Refining 1 Batchelder, NW NE NW 28-22n-3w, elev. 1,091 ft., dry, TD 4,351 ft., Layton 4,263 ft.

Hughes County: Carl B. King Drilling Co. 1 Cusack, NW NW NW 26-9n-10e, elev. 779 ft., dry, TD 4,010 ft., Cromwell 3,131 ft., May 3,570 ft., Woodford 3,755 ft., Hunton 3,775 ft., Sylvan 3,855 ft., Viola 3,940 ft, Wilcox 4,001 ft.

Texas Co. 1 Barnes, SE NW SW 33-6n-8e, dry, TD 5,132 ft., elev. 856 ft., Cromwell 3,544 ft., Woodford 4,492 ft., Hunton 4,735 ft., Sylvan 4,780 ft., Viola 4,872 ft., Wilcox 5,006 ft., 2nd Wilcox 5,107 ft.

Lincoln County: Jordan Petroleum 1 Keegan, NW NW SW 5-13n-5e, dry, TD 4,910 ft., elev. 795 ft., Bartlesville 3,946 ft., May 4,315 ft., Woodford 4,495 ft., Hunton 4,545 ft., Sylvan 4,624 ft., Viola 4,711 ft., Wilcox 4,783 ft., 2nd Wilcox 4,805 ft.

Logan County: Reno et al 1 Howland, NE NE SE 30-19n-3w, dry, TD 5,538 ft., elev. 954 ft., Tonkawa sand 3,740 ft., Layton 4,455 ft., Checkerboard 4,948 ft., Oswego 5,153 ft., May 5,495 ft.

LA.-ARK.

Webster Parish Test Flows 15 Bbl. per Hour

SHREVEPORT.—Hunt Oil Co. 1 Roberts, a discovery well in 11-23n-10w, in Webster Parish, is acidizing through perforations at 5,734-44 ft., after flowing 15 bbl. per hour on initial test. Perforations are in the Pettit lime, and the oil had a 30 per cent wash water cutting, but no salt water.

Tom Palmer 1 Gill, NW SE 3-10n-13w, a wildcat in the Benson area of DeSoto Parish, set surface pipe at 710 ft., and was waiting. The test is scheduled for the Pettit lime.

In the Arkansas fields, McAlester Fuel Co. 1 Couch-Staggs, NW SW 11-16s-20w, a Columbia County wildcat, perforated at 6,757-61 ft., acidized, and swabbed an estimated 100 bbl. per day of 38° gravity oil.

NORTH LOUISIANA SUCCESSFUL WILDCATS

Bienville Parish: Sailes pool discovery—Ohio Oil 1 Woodard-Walker, SE NE SE 31-17n-7w, elev. 274 ft., flowed 356 bbl. 39.2° gravity oil in 20 hours, 8 hours on ¼-in. choke, 12 hours on 12/64-in. choke, GOR 340 cu. ft., pay zone Pettit lime 6,799-6,819 ft. and 6,829-56 ft., TD 7,011 ft., tops Glen Rose 4,413 ft., anhydrite 4,995 ft., James 6,120 ft., Sligo 6,633 ft., Pettit 6,799-6,860 ft. Allowable 177 bbl. daily.

Caldwell Parish: Vixen gas pool discovery—Shell 1 Louisiana Central, SW SW NW 31-15n-3e, elev. 188 ft., flowed 9,000,000 cu. ft. gas, TD 11,615 ft., pay zones Travis Peak 9,610-34 ft. and 9,676-9,700 ft. Tops, Travis Peak 7,630 ft., Cotton Valley 10,350 ft.

NORTH LOUISIANA WILDCAT FAILURE

Sabine Parish: Panhandle Refining 1 Whitney Corp., SE SE NE 29-10n-14w, dry, elev. 210 ft., TD 6,553 ft., tops Paluxy 3,150 ft., top James 5,720 ft., bottom James 5,978 ft., top 3rd Fgr. Ld. 6,080 ft.

MISSISSIPPI

New Pay Cored Below Tinsley Field

JACKSON.—Saturated lime nearly 5,000 ft. below present producing horizons has been cored in Yazoo County's Tinsley field by Union Oil Co. drills, and speculation runs that it might be the true Smackover formation, which produces heavily in Arkansas. The find is being studied for prospects of developing a new field below the Eutaw. Producing Eutaw sands in the field are usually found at about 5,200-5,500 ft. The new zone of saturation is at about 11,000 ft.

In Rankin County, an independent oil producer, Leonard Jones of Jackson, reports production of 800 bbl. of 14.9° gravity crude from the old Boehle 1, a gas well abandoned in 1943. The well is located in 18-5n-2e, and is flowing about 25 bbl. per day.

MISSISSIPPI WILDCAT FAILURES

Clarke County: C. E. Walters 1 McClellan, SE SE 4-10n-9w, dry, TD 5,573 ft., elev. 483 ft., Eutaw 5,356 ft., City Bank 5,471 ft., Stanley 5,538 ft.

Madison County: Carter Oil 1 Howell, NW SW 6-10n-4e, dry, TD 5,056 ft., elev. 236 ft., no tops available.

Wilkinson County: Rogers-Lacy 1 Miles, NW SE 35-1n-1w, dry, TD 10,025 ft., elev. 270 ft., Wilcox 6,645 ft., basal Wilcox 10,020 ft.

ALABAMA WILDCAT FAILURE

Marengo County: A. W. Hutchings Trust 1 M. Wadlington Co. et al, SW SE 18-12n-1e, dry, TD 4,230 ft., elev. 180 ft.,

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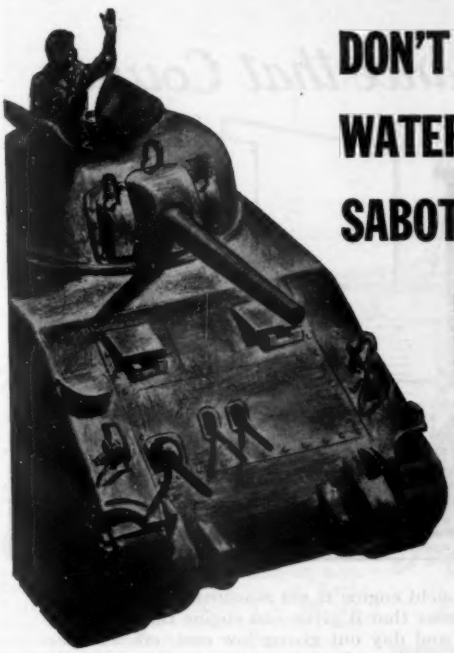

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GEORGIA WILDCAT FAILURE

Wayne County: H. Byers et al 2 Dean, 300 ft. NW center Land Lot 127, 3rd Land District, dry, TD 345 ft., hole junked.

APPALACHIAN FIELD

Strat Trap Possibilities in Southeast Ohio Gas Field

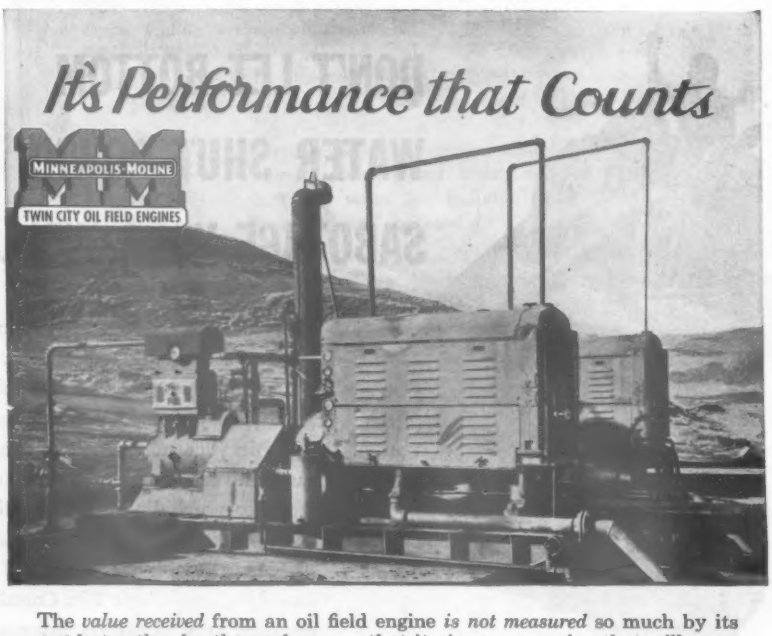
PITTSBURGH.—Ohio Oil Co. completed a good Oriskany gas well on the Richard Denny farm, Section 12, Knox Township, Columbiana County, Ohio. The new field so far proven extends about 2 miles. The three good Oriskany completions indicate possibilities of a stratigraphic trap of considerable size, and tests are drilling as far as 6 miles northeast of Mahoning County.

In Greene County, Southwest Pennsylvania, L. J. Houze Convex Glass Co. completed an Injun sand test on the W. A. Rumble farm, good for 5 to 10 bbl. from pay zone at 1,730-37 ft. This well is 3 miles southeast of Willow Tree, and 1½ miles east of nearest production. Most production in this area is south and southwest of Willow Tree, and usually is Dunkard sand oil.

In Washington County, North Strabane Township, Beedle et al are drilling a test on Grant & Hugh Boyles farm, 1,500 ft. northwest of the Gordon sand well of Charles E. Young on the George B. Ackroyd farm. The Ackroyd well is now cased, after cleaning out a bridge, and during casing, made several flows, producing all told 150 bbl. during the week by flow and swab.

In West Virginia, the Virginian Gasoline & Oil Co. 1360 Imperial Coal Co., an edge well in the Cabin Creek district of Kanawha County, was completed for 10 bbl. in the Injun sand. Two gas wells were completed this week, one in the Jefferson district, Lincoln County, and one in the Washington district, Boone County.

In Nicholas County, wildcatting has extended from the Jefferson district, where good gas wells have been completed, to the east in the Grant district, and to the southeast in the Nuttall district.



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ROCKY MOUNTAIN

Colo. Test Fails in K. C. Lime—Drilling Ahead

DENVER.—The Union Oil Co. of California wildcat on the East May Valley structure, Prowers County, southeastern Colorado, which had a show of oil in the Kansas City lime sufficient to warrant running pipe and testing, proved a disappointment and is drilling deeper. This is 1 Kroell, SE NW NW 27-21s-46w, joint with Richfield Oil Co. It topped the Kansas City lime at 3,618 ft., and reported saturation at 3,792-3,812 ft. in cores. It was drilled to 3,960 ft. and 5½-in. was run and cemented at 3,918 ft. Upon perforating at 3,797-3,812 ft. and testing, only sulfur water was recovered. The casing will be pulled and hole carried on down to the Arbuckle, expected at around 5,800 ft.

Good show at Powder Wash.—Mountain Fuel Supply Co. 3 Allen, SE SE NW 33-12n-97w, Powder Wash field, Moffat County, Colorado, had an oil sand at 4,338-57 ft., in the Wasatch formation which showed for 100 bbl. per hour on a 45-minute drill-stem test. While this looks like a big well, it does not necessarily mean that proving of any important reserves back of it since it is a well-known fact that the Wasatch sands at Powder Wash are lenticular and do not hold up to the spectacular results indicated in initial tests. Another gas sand, estimated at 4,000,000 to 5,000,000 cu. ft. of gas per day, was picked up below the oil sand at 4,528 ft.

Kutz Canon test.—Transcal Petroleum Corp. 1 Davidson, NW NW 28-28n-10w, Kutz Canon district, San Juan County, New Mexico, following replacement of light portable rig with heavy rotary tools, has resumed drilling at 3,420 ft. It is coring at 4,215 ft. in shale and feeling for the objective Point Lookout sand. Location is 1 mile east of 1 Day, drilled by the Kutz Canon Oil & Gas Co. to the top of the Point Lookout sand several years ago where it had a good show of oil only to lose the hole without testing. This company has a joint interest in the present test. Southern Union Production Co. has made a location 1½ miles northeast of the Davidson well in 1 Cain (Federal), C SW SW 15-28n-10w. These tests are particularly interesting in as much as several of the majors are now reported leasing extensive areas throughout the San Juan Basin following the recent discovery of 60,000,000 cu. ft. of gas a day in the lower Pennsylvanian on the Barker Creek dome by Southern Union Production Co.

Sundance sand test at Winkelman.—Stanolind Oil & Gas Co., which brought in a new field in the Tensleep on the Winkleman dome, Fremont County, Wyoming, last year, has been testing oil shows in the Sundance in its 6 Tribal, SW NE NW 19-2n-1w. It was drilled to 1,379 ft. and plugged back to 1,295 ft. Last of sev-

eral tests showed one-half barrel of 19.5° gravity oil per hour on a 10-hour bailing test. The 9⅝-in. has been pulled and drilling has been resumed. It is close to 3 Shoshone-Arapaho which was completed last year for 600,000 cu. ft. of gas in the Dakota series through perforations at 500 to 738 ft.

Producer in Devon area.—Texas Co.'s persistent effort to open a new oil pool in the Devon area on the east flank of the Kevin-Sunburst field has resulted in another producer in its 2 Wier, NW NE NE 4-33n-1e. It was completed at 1,665 ft., 1 ft. in the Madison, topped at 1,664 ft., and on final test flowed 40 bbl. of oil and 15 bbl. of water through a ¼-in. choke in 24 hours. When the sand was encountered it flowed 74 bbl. first 8 hours with 4,000,000 cu. ft. of gas, 10 per cent water. It then flowed 21 bbl. in the second 8 hours and 28 bbl. in the third 12 hours, both with 30 per cent water. This well is located 1,320 ft. north of 1 Wier, the discovery, which flowed 83 bbl. of clean oil in 27 hours, but on first 12-days' test averaged 20 bbl. of oil and 10 bbl. of water per day. Location has been made for a third well 1,320 ft. west of the discovery. An east offset to the discovery, 1 Ekholt, pumped 20 bbl. per day, no water, after acidizing. No. 2 Ekholt, east offset to 1 Ekholt, was a dry hole.

More wildcats starting.—Among the more important wildcats getting started is a test of East Muskrat dome, Fremont County, Wyoming, by Shannon Oil Corp. and Dan Hogan and associates in 1 State, SW NW NE 16-33n-91w. Contract has been let to Parker Drilling Co. This structure is a high on the northwest-southeast line of folding upon which are three highs to the northwest known as the Muskrat field in which Sinclair-Wyoming Oil Co. has big gas production in the Frontier and Dakota sands. The East Muskrat wildcat will test the Cretaceous, in which gas and possibly oil is looked for in the Frontier and Dakota sands and results in those horizons will determine whether the well will be carried to the Tensleep. Only one well, 2½ miles to the northwest, on the Ohio high, has been drilled to the Tensleep, stopping in the Madison at 8,112 ft., total depth.

Mule Creek Oil Co., joint with Shannon Oil Corp., is moving in for an Embar-Tensleep test on the Murphy dome, Hot Springs County, Wyoming, in 1 Shad, SE NE SE 6-43n-91w.

British-American Oil Producing Co. is building rig for a wildcat on Little Medicine Bow, in Carbon County, Wyoming, 6 miles east of the Medicine Bow oil field in 1 Union Pacific, SE SW SE 23-21n-78w.

Pure Oil Co., in its first operation in this area, has made a location for a Tensleep test in the district north of Worland, Washakie County, Wyoming, in 1 Unit, NE NE NW 18-48n-92w.

Western Oil Refining Co. has spudded in a wildcat north of the La Barge field, Sublette County, Wyoming, on North La Barge structure in 4-9 Government, NW SW NW 9-27n-113w.

Republic Oil Co. has derrick up for 1 Eberle, CEL SE SW 9-6n-91w, Craig structure, Moffat County, Colorado, to test the Mesa Verde at 4,000 ft. and possibly go deeper. This wildcat is near some old gassers drilled several years ago by Ohio Oil Co. It spudded a year ago and drilled to 1,919 ft. where it shut down for heavier rig which was moved in from California.

COLORADO—SUCCESSFUL WILDCAT

Rio Blanco County, Rangely Extension—Stanolind 1 Rector, CEL NE SE 34-2n-102w, TD 6,242 ft., top Weber 5,264 ft., 7-in. 5,629 ft., flowed 365 bbl. of oil in 24 hours after shot.

MONTANA—SUCCESSFUL WILDCAT

Pondera County, Pondera Extension—Triway Oil Co. 9 Copley, NE NE NE 15-27n-4w, TD 1,930 ft., Ellis-Madison 1,915 ft., pay sand 1,926-30 ft., 500 ft. oil in hole, est. 100 bbl.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended June 9, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	0	0	0	0	7	28	35
Indiana	0	0	0	2	2	2	0	0	10	12
Illinois	0	0	0	5	5	19	0	0	110	129
Kentucky	1	0	1	2	4	11	0	2	18	31
Michigan	1	0	0	1	2	5	0	2	104	111
Kansas	0	0	0	6	6	18	0	9	142	169
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	9	9
Oklahoma	0	1	1	6	8	43	1	7	144	195
Texas:										
North Central	2	0	0	8	10	40	0	4	202	246
West	0	0	0	7	7	26	0	0	129	155
Panhandle	0	0	0	0	0	0	0	1	4	5
Eastern	0	0	0	1	1	5	3	0	38	46
Gulf Coast	0	0	0	11	11	26	2	14	123	165
Southwest	0	0	0	3	3	9	1	3	77	90
Total Texas	2	0	0	30	32	106	6	22	573	707
Louisiana:										
Northern	1	0	1	1	3	2	1	4	29	36
Southern	0	0	0	3	3	13	1	0	23	37
Total Louisiana	1	0	1	4	6	15	2	4	52	73
Arkansas	0	0	0	0	0	0	0	0	22	22
Mississippi	0	0	0	3	3	3	0	0	49	52
Ala., Ga., Florida	0	0	0	2	2	0	0	1	15	16
Montana	1	0	0	0	1	7	0	0	9	16
Wyoming	0	0	0	0	0	8	0	0	17	25
Colorado-Utah	1	0	0	0	1	1	0	0	3	4
New Mexico	0	0	0	3	3	6	0	2	29	37
California	0	0	0	3	3	1	0	2	86	89
Total United States	7	1	3	67	78	245	9	58	1,420	1,732
Total previous week	9	2	4	73	88					

NORTHWEST NEW MEXICO WILDCAT FAILURE

McKinley County, Walker dome: Plymouth Oil Co. 1 Santa Fe Railroad, C SW NW 13-15n-10, TD 2,995 ft., lost hole, skidding rig.

CANADIAN FIELDS

Turner Valley Extended South and East

CHATHAM.—Extending the Turner Valley producing area to the south and east, Imperial Federated 1, LSD 16, 5-18-2w5, with Madison limestone at 8,227-8,447 ft., indicated production of 456 bbl. after acidizing. The completion opens new possibilities of extension to the south.

Lloydminster.—In the Lloydminster field, eastern Alberta, Smyth 1, LSD 16, 21-49-1w4, is testing a sand at 1,968-74 ft. with indications of a fair production of 14° gravity oil.

Coalspur.—In the northern Alberta foothills, Imperial-Coalspur 1, LSD 10, 8-49-21w5, record deep test for Canada, got Madison limestone contact at 12,758 ft. and is deepening below 13,000 ft.

Calling Valley.—On the Calling Valley structure northeast of Turner Valley, Calling Valley 1, LSD 6, 24-21-3w5, finished in Madison limestone at 10,025 ft., when the lower porous horizon showed salt water. Upper porous is acidizing and testing.

Rainy Hills.—An important test for oil in the Devonian limestone is being undertaken in the deepening of Rainy Hills 1, SW¼ 34-19-10w4. Drilled to 3,500 ft. by a Calgary syndicate in 1939, the well got some oil shows in the basal Colorado and the Madison, and plugged off a 5,000,000 cu. ft. gas flow. Location is 10 miles east and 3 miles south of Devonian production in the Steveville field, and drilling, sponsored jointly by Anglo-Canadian Oil Co., Calmont Oils, McDougall-Segur Exploration Co. and Home Oil Co. is expected to get the Devonian around 4,200 ft.

Steveville.—In the Steveville field, eastern Alberta, Princess-C.P.R., 58-22-A, LSD 14, 22-20-12w4, finished at 3,977 ft. in the Devonian, has indicated production between 200 and 300 bbl.

Saskatchewan.—In the Vera-Unity field, western Saskatchewan, Bata Petroleums 4, LSD 14, 24-39-23w3, finished a gasser at 1,650 ft. estimated at 1,600,000 cu. ft.

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Among the Drilling Contractors

Trio Drilling Co. is contractor on the Guy Wray 1 Eugene Sisson et al, in SE NW NE 15-2n-16w, Allegan County, Michigan.

Withers Drilling Contractors, headed by C. H. Withers of Lloydminster, Alta., is completing S.A.E.C. 1 in the Saskatchewan portion of the Lloydminster field and is spudding Smith 1, LSD 16, 21-49-1w4, in the same area.

Kern Drilling Co. will shortly begin making hole on two additional wells to be drilled on the Vincent property in the Santa Maria Valley field in California by Union Oil Co.

Earl Wakefield has the contract to drill the S. A. Yarbell 1 Hansen, in SW NW NE 31-33-3e, Cowley County, Kansas. Test is located in the southwestern part of the county and closest production is in the old Rainbow pool.

Max Spidel is the drilling contractor on the Albert Maring 1 Walter Stone, in NE SW SE 6-3n-12w, Allegan County, Michigan.

Herring & Byars Core Drilling Co., Wichita, Kans., has been organized to engage in contract work in geological exploration by use of the core drill. The firm is headed by Frank Herring, geologist, formerly of Elledge & Herring, and C. E. Byars, formerly drilling superintendent of Rocky Mountain Drilling Co., at Casper, Wyo.

Helmerich & Payne, Inc., is contractor on the Carter Oil Co. 1 Webber, in C NW SE 26-31-4w, Sumner County, Kansas. This is a wildcat test 15 miles west of the Wellington pool production.

General Petroleums of Calgary, Alta., is moving rig for Bata Petroleums 5, LSD 4, 25-39-23w3, in the Vera-Unity field of western Saskatchewan, after completing two good gassers for the same company.

A. E. Crumley & Sons of Shelby, Mont., have contract to drill Fraser-Alberta Government 1, LSD 4, 13-2-11w4, in southern Alberta just north of the Montana boundary. The acreage, owned by Hugh Fraser of Cut Bank, is 5 miles northeast of the

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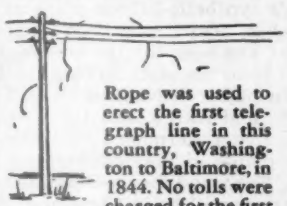

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large Rogers-Imperial gasser drilled more than 20 years ago.

General Petroleums of Calgary, Alta., now drilling Bata 4, LSD 14, 24-39-23w3, in the Vera-Unity area of western Saskatchewan, has contracted for a program of nine wells for the same company in this area.

Newell & Chandler of Calgary, Alta., who recently completed Toronto Syndicate 1 in the Steveville-Princess field, eastern Alberta, as a good gasser, is moving the heavy-duty outfit to a new location 2 miles west for Toronto Syndicate 2.

Ferguson & Shafer will drill the Marvel Production Co. 4 Dykhuis-Pelon Comm., in SW SE NE 3-4n-15w, Allegan County, Michigan.

American oil-well drilling contractors are being sought by the French Government to sink exploratory and development wells in southwestern France near the Spanish coast and to the east along the Mediterranean Sea. Raymond Godet, member of a French mission sent to this country to arrange contracts, is in Dallas, interviewing contractors. He stated that the French Government wants wells drilled on 12 or more structures in France.

Ralph Perry is contractor on the Carl E. Grimes 1 G. Way and J. Uramkin, in SE SE SW 35-1s-13w, Van Buren County, Michigan.

Tom Allan has the drilling contract on the Doley Oil Co. 1 Lane Estate, in NE NE SE 33-10-19w, Rooks County, Kansas. The test is 1½ miles west of Lansing production in the Zurich pool.

Vedder Supply Co. has the drilling contract on the Ohio Oil Co. 1 Kelch, in NE NE NE 2-12-22w, Trego County, Kansas. The test is approximately 8 miles from production in the Cotton pool. It has been spudded and surface pipe is set below 350 ft.

Newell & Chandler, of Calgary, Alta., are starting Mid-Continent-East Crest 6 in LSD 3, 8-6-15w4, in the Conrad field, southern Alberta, following completion of Mid-Continent 5 as a good producer.

CALENDAR

June

Canadian Gas Association, annual convention, Manoir Richelieu Hotel, Murray Bay, Quebec, June 19-22.

October

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6.

I.P.A.A., annual membership meeting, Tulsa, October 15, 16 and 17.

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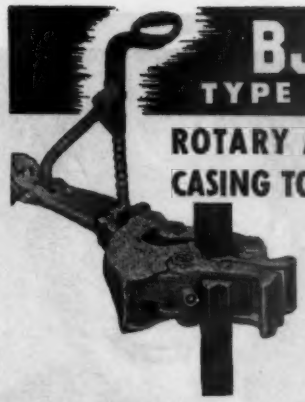

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PERSONALS

DeFriest Advanced To New Post for Socony-Vacuum

AS assistant to B. Brewster Jennings, president of Socony-Vacuum Oil Co., A. H. DeFriest will devote his attention largely to general planning of the company's various operations. DeFriest's advancement to this new post marks another step in the varied oil-industry experience of this young executive, still in his forties.

After serving in World War 1, DeFriest entered the export school of the old Standard Oil Co. of New York and upon completion of his training went to the Orient, where he served in many localities and capacities. Returning to the United States in 1929, he was transferred to General Petroleum Corp., subsidiary of Socony-Vacuum, where he was promoted steadily through many positions until the end of 1932, when he was sent to Japan for a year as assistant general manager of Socony-Vacuum. In 1934 he returned to General Petroleum as vice president, which position he held until his current assignment to New York.

Everette Lee De Golyer, geologist, has been elected a director of Empire Trust Co., New York. He is a partner in the firm De Golyer & MacNaughton, of Dallas.

A. N. Lucie-Smith, formerly chief exploitation engineer for Compania de Petroleo Shell de Colombia, at Bogota, is now with Caribbean Petroleum Co. in Maracaibo, Venezuela.

J. H. Loudon, formerly manager at Caracas, Venezuela, for Royal Dutch Shell Group, has been promoted to general manager, succeeding **N. C. Watson,** who resigned last month. Loudon will be responsible for the business administration and operations of Royal Dutch Shell Group throughout Venezuela. His assistant at Caracas is **Clare Taylor,** and his assistant in operations throughout the country is **W. E. Madden.**

Lum Price, salvage expert for Humble Oil & Refining Co., is head of the volunteer Committee for Industrial Salvage, of Houston, which has led the Southwest in its field of activity during the past 3 years and which has been commended as a national pacemaker by the regional manager of War Production Board's conservation and salvage division. Up to May 1 of this year the Houston committee had shipped 413,000 long tons of salvagable scrap material to reclamation depots.

David M. Grubbs, formerly district geologist for Shell Oil Co., Inc., in Jackson, Miss., has moved to Fort Worth, where he is with Danciger Oil & Refining Co., as assistant chief geologist.

Z. W. (Zeke) McCoy will leave the United States this month for Bogota, Colombia, where he will join the materials department of Texas Petroleum Co. He was formerly connected with Colombian Petroleum Co. and more recently with The Texas Co. in California.

T. H. Philpott, The Carter Oil Co., was elected president of Shreveport Geological Society at its annual meeting. **Van D. Robinson,** The Atlantic Refining Co., was chosen vice president, and **W. E. Wallace,** Sohio Corp., secretary-treasurer.

H. O. Harder, division superintendent for Cities Service Oil Co. in Oklahoma City, was guest speaker at the annual banquet of Petroleum Engineers' Club, University of Oklahoma, on June 5. He discussed the cleaning out and reconditioning of oil and gas wells by the new process of detonating glass marbles.

Lt. (jg) John C. Hostetler, production engineer at Wickett, Tex., for Gulf Oil Corp. when he enlisted in the Navy as an ensign in 1943, has been awarded the Bronze Star for heroic action in the South Pacific theater. Lieutenant Hostetler graduated from Pennsylvania State College with a B.S. in chemical engineering. He is now stationed at Houston as petroleum inspector.

R. L. Jewell, formerly production engineer for Creole Petroleum Co. in Venezuela, has joined Caribbean Petroleum Co., with headquarters in Maracaibo.

Rowland G. Whealton, formerly assistant director of production in District 5 (Pacific Coast), Petroleum Administration for War, has been made director, taking the place of **E. L. Davis,** Long Beach, Calif., who resigned to return to private industry. Whealton graduated from Stanford University with a bachelor's degree in geology, later receiving his master's degree from the same institution. When he joined PAW he was general superintendent for M. O. Johnston Oil Field Service Corp., Los Angeles. Davis was development and research engineer for The Texas Co. when he joined PAW.

T. U. Blake, formerly plant engineer at B. F. Goodrich Chemical Co.'s synthetic-rubber plant at Port Neches, Tex., has been appointed chief engineer for the company. He will head the staff serving the Geon resin plants in Niagara Falls, Louisville, and Akron, and the company-operated government synthetic-rubber plants in Port Neches and Borger, Tex., and Louisville. His headquarters will be in Cleveland. Blake graduated in mechanical engineering at Cornell University. **F. V. Morrison,** University of Iowa graduate and formerly power engineer, succeeds Blake at Port Neches.

C. O. Hage, of the Geological Survey of Canada, who carried on survey work for years in the western provinces, has resigned to join the Shell Oil Co., Inc., geological staff.

Kenneth Harris and **E. S. Taxman,** of Kansas City, both operators in Kansas oil fields, have formed a partnership to develop production in Barton County, that state, where they have bought an 800-acre block. Taxman formerly operated The El Dorado Refining Co., El Dorado, Kans.

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MARKET QUOTATIONS

Prices as of June 12, 1945

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78†	70-74
Mid-Continent*	6.75	5.875
Gulf Coast	6.75	5.625
Northeast Coast	...	8.075
California	...	6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.500	5.400
North Texas (f.o.b. plant)	4.125	4.950
North Louisiana (f.o.b. plant)	4.375	5.250
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois Basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.08

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
38-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended June 2, 1945

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Distillate	Stocks: Residual
East Coast	781	13,764	6,346	6,116
Appalachian	153	4,523	461	337
Ill., Ind., Ky.	788	21,690	4,025	1,957
Okla., Kan., Mo.	384	9,376	1,691	1,200
Inland Texas	242	2,902	477	397
Tex. Gulf Coast	1,031	13,553	5,766	5,513
La. Gulf Coast	279	4,106	1,518	1,122
North La., Ark.	83	2,403	911	198
Rocky Mt.	120	2,446	292	645
California	933	13,933	8,332	21,037
Total 6- 2-45	4,804	88,696*	29,819	39,022
Total 5-26-45	4,950	89,121	29,184	38,548
Total 6- 3-44	4,639	86,801	32,640	51,037

*Military 40,054, civilian 48,642.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
June 2, 1945	224,079,000
May 26, 1945	222,831,000
June 3, 1944	231,290,000

*Excludes unrefinable California stocks.

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Rex E. Galloup, Phone 6436, Lubbock, Texas

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CARL MOULDEN

ARMIN G. KESSLER

MARSHAL NOEL

Equipment Men in News

Frank M. Hawley has been made vice president, general manager, and board member of Morse Chain Co., Ithaca, N. Y., and Detroit, Mich. He succeeds **C. J. Konerson,** who retires as active head and continues as a director and vice president. **Stanley B. Waring,** formerly secretary, was elected secretary and treasurer. **Paul W. Bernhard** has been appointed advertising manager.

George S. Garrard has been appointed chief engineer of Briggs Clarifier Co., Washington, D. C., and Bethesda, Md. He was formerly assistant chief engineer of Jacobs Aircraft Engine Co.

Sperry-Sun Well Surveying Co., Philadelphia, Pa., has appointed Moulden Oilfield Services as exclusive representatives in the Rocky Mountain territory. **Carl Moulden** heads Moulden Oilfield Services, with headquarters in Casper, Wyo.

Armin G. Kessler has been appointed manager of sales of the midwestern district for Farrel-Birmingham Co., Inc., with headquarters in Akron, Ohio. He joined the company in 1920 as general manager of the Buffalo, N. Y., plant, and has been a vice president and director since 1923.

Marshal Noel has been appointed general sales manager of the tractor division of Allis-Chalmers. **William J. Faulkner** becomes industrial sales manager, and newly appointed agricultural sales manager is **H. A. Gratner.** Other appointments make **Louis Adams** harvester line sales manager, **S. H. Sorenson** assistant harvester line sales manager, **Ernest Franks** in charge of wheel tractor sales for industrial purposes, and **Boyd S. Oberlink** assistant to the vice president, tractor division.

J. A. Rumpsa has been appointed director of purchases for Young Radiator Co., Racine, Wis.

H. A. Hofflander has been employed by Tulsa Boiler & Machinery Co. as warehouse manager of a new warehouse steel division at the company's plant at West Tulsa, Okla. Recently discharged from the Navy, Hofflander was formerly district sales manager for Sheffield Steel Corp.

Thomas J. Bannan, president, Western Gear Works, Seattle, Wash., and Los Angeles, Calif., and its associate, Pacific Gear & Tool Works, San Francisco, Calif., was recently elected vice president of the American Gear Manufacturers Association. Bannan is also president of Webster-Brinklet Co. and Hallidie Machine Co., of Seattle.

Gorham W. Woods is now a member of the engineering staff of The Lincoln Electric Co., Cleveland, Ohio. Woods was formerly chief chemist of Hughes Tool Co., and for the past 3 years he has been process engineer for the Dickson Gun Plant, a Hughes-operated concern.

Kieley & Mueller, Inc., North Bergen, N. J., announces the appointment of Jno. D. Hiles Co., Plaza Building, Pittsburgh, Pa., as agents in that area for the K & M line of level and pressure controls and steam specialties.

Robert C. Wallace, vice president and director of Marmon-Herrington Co., and director of engineering for the company, has been elected chairman of the Indiana Section of the Society of Automotive Engineers, to serve for the year beginning June 1.

Mrs. Harvey C. Garber has been reelected president and general manager of the Stitt Ignition Co., Columbus, Ohio, for the eighth consecutive term. Other officers renamed were **B. F. Stitt,** vice president; **M. H. Spung,** secretary-treasurer, and **C. J. Collet,** auditor.

G. P. Vincent, manager of the sales development and technical service department of The Mathieson Alkali Works, has been appointed to the newly created position of technical director. In addition to his former duties, he will direct research and technical development and advise on technical matters concerning plant operation. In these latter capacities, he succeeds **R. E. Gage,** who was director of research and development for Mathieson for 14 years and has now been appointed technical advisor.

Eutectic Welding Alloys Co. announces the appointment of **John Paul Apren** as advertising and public relations director. He will maintain his headquarters at the home office of the company, 40 Worth Street, New York City.

A new partnership in engineering and designing of refining and similar equipment and processes has been effected under the name of the Stover-Stephens Co., recent announcement discloses. The company is headed by **W. A. Stover** and **L. G. Stephens.** Headquarters of the company are at 909 Palace Building, Tulsa.

R. P. Tyler, general sales manager of Macwhyte Co., has appointed **Fred M. Sime** as district sales manager for the Pacific Southwest and **William J. Brett,** district sales manager for the Pacific Northwest. Sime is located at the San Francisco office, 749 Bryant Street, and Brett is located at the Portland office, 1603 N.W. 14th Avenue.

E. B. Drisko, West Coast manager for Broderick & Bascom Rope Co., Inc., has been retired. The company announces the appointment of **T. Verhoef** to the position of Northwest manager.

John Mitchell has been appointed manager of the products section of the alloy sales division of Carnegie-Illinois Steel Corp., leaving the position of alloy metallurgical engineer of this U. S. Steel subsidiary.

Gordon Z. Greene, of Robinson Orifice Fitting Co., Los Angeles, recently returned from a trip through Texas and Louisiana, on which he visited most of the larger cycling plants in operation. He reports a definite trend toward the use of equipment in the higher-pressure range.

Daniel A. Herrick has been appointed manager of sales of d'Este division of American Chain & Cable Co., Inc., with headquarters in Reading, Pa.

Keasbey & Mattoon Co., Ambler, Pa., manufacturers of asbestos and magnesia products, formally opened its enlarged research laboratory on May 25. The laboratory has been quadrupled in size.

Don Bowers, formerly vice president of W. C. Norris Manufacturer, Inc., Tulsa, has been elected president, succeeding the late W. C. Norris. **J. H. Eustice,** formerly general manager, was named to take Bowers' former post, but continuing to perform the duties of general manager.

Harold Connor has been named manager of the Bronx and White Plains branches of the sales department of Mack Trucks, Inc., in the territory of the Greater New York division. **John J. Bryne** has been appointed bus sales manager for the same territory. His former post as national account sales manager will be filled by **R. J. Meinert.**

Carter T. Pollock has been appointed manager of the central district for Crane Co., with headquarters in Chicago, Ill. **W. A. Burbine** is manager of the Chicago branch, **A. N. Rosborough** is manager of the Cleveland branch, **W. D. LaRue** manager of the Toledo branch, and **R. C. Danielson** manager of the Muncie, Ind., branch.

H. W. Overman has been placed in charge of industrial friction materials for Thermoid Co., Trenton, N. J.

J. J. Grogan has been elected assistant treasurer, and **V. H. Mantz** as assistant secretary of Allegheny Ludlum Steel Corp.

Macwhyte Co., Kenosha, Wis., has been awarded the third star in its Army-Navy "E," for outstanding achievement in war production.

The Wheeling plant of Wheeling Corrugating Co. has received its fifth Army-Navy "E" award, giving it four white stars.